1992 GUIDE TO CHEMICAL CONTROL OF WEEDS AND PLANT DISEASES

Introduction

Weed Control/ Crop Charts

Herbicide Directory

Disease Crop Charts

Fungicide Directory

Manitoba Agriculture

Introduction

GUIDE EVALUATION - HELP US MAKE AN EVEN BETTER GUIDE

We would like to know what you think about this guide - what is good, what could be improved and how. You will note that the *1992 Guide to Chemical Control of Weeds and Plant Diseases* has a new format. We think it is good but we would like to know how we can make it even better! Please take a few minutes to pass on your opinions and ideas. Circle the best answer to these questions, then give us your ideas. Thanks for your help!

Mail to: Crop Management Section, Box 2000, Carman, MB, R0G 0J0 or pass this questionnaire along to your ag rep.

Which category describes you? (circle one)
Grower Dealer Other _____

If you are a grower, how many acres are you currently farming? _____ acres

How did you get this copy? (check one)
At ag rep office _____
At weed supervisor office _____
At meeting/short course _____
Mailed at my request _____
At dealer outlet _____
Other _____

In general, how do you rate this guide? (circle one) Excellent Good Satisfactory Poor

Is the information in it relevant to your needs? Essential Valuable Useful Helps a bit No value

Is the writing clear? Very clear Mostly clear Could be simpler Often confusing

Are the tables easy to understand? Very clear Mostly clear Could be simpler Often confusing

Is the amount of technical detail right for you? Just right Not enough detail Too much detail

What are your main sources of pest control information? (Number choices in order of importance, using "1" for the most important source.) Leave it blank if you do not use that source.

_____ This guide
_____ Dealer
_____ Applicator
_____ Ag rep
_____ Weed supervisor
_____ Other growers
_____ Chemical company representative
_____ Other

Which of the following information would you like to see continued in this guide? (Place a 'check' beside each item you consider valuable information.)

a) Charts _____
b) Product prices _____
c) Weather information _____
d) Tank cleaning information _____
e) Safety information _____
f) Product hazard ratings _____
g) Tank mixing information _____
h) Fungicide information _____
i) Special weeds _____

How we can make this book more useful to you?

_____

_____

If you would like to write your name and phone number, please do. If not, feel free to leave this section blank.

Name _____

Address _____

Phone Number _____

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1992 Guide to Chemical Control of Weeds and Plant Diseases

This publication is prepared by Manitoba Agriculture in co-operation with Research Personnel in Industry, the University of Manitoba and Agriculture Canada.

How To Use This Book

For Weed Control Information

1. Turn to the **Weed Control/Crop Charts**. Select the chart for the crop you plan to grow. Use the chart to match your weed problems with the herbicides available for that crop.
2. Once you have narrowed your product down to a few candidates, go to the **Herbicide Directory**. Read the recommendations thoroughly for each product you are considering.
3. Read the product label attached to the container for detailed instructions on application.

For Disease Control Information

1. Turn to the **Plant Disease Control Tables**. Use the charts to match the disease problem with the disease control products available for that crop.
2. Go to the **Plant Disease Control Products Directory**. Read through the recommendations on the product you are considering.
3. Read the product label attached to the container for detailed instructions on application.

The **Guide to Chemical Control of Weeds and Plant Diseases** includes the most recent recommendations for weed and plant disease control in field and forage crops in Manitoba. These recommendations are based on the uses registered under Agriculture Canada's Pest Control Products Act which apply to Manitoba conditions. It is an offence under The Pest Control Products Act to apply any in a manner not consistent with the product label. If you have doubt regarding the instructions in this publication or on the product label contact the company representative or Manitoba Agriculture for further advice. For information on weed control in commercial horticulture crops, sugar beets and industrial weed control, consult Manitoba Agriculture staff for other publications which outline pest control techniques in these areas.

Remember that a sound pest control program consists of more than just application of chemicals. Chemical usage must be combined with appropriate crop selection, good cultural practices and use of other control methods. Additional information on cultural, mechanical and biological control methods of weeds and diseases can be obtained from your agricultural representative, weed specialist or crop specialist; your local weed supervisor; the Plant Science Department at the University of Manitoba- and Agriculture Canada Research Stations at Brandon and Morden.

Any use of herbicides or fungicides not recommended by Manitoba Agriculture must have the approval of the Environmental Control Branch of the Department of Environment.

Government departments, Crown corporations, municipal corporations or any agent acting on their behalf should contact the Environmental Control Branch of the Department of Environment and obtain the required pesticide use permits before applying any chemical.

In the use of pesticides, responsibility rests on the user to prevent spray drift onto susceptible crops or damage to crops from improper use. The user must also ensure that containers are properly rinsed and delivered to designated pesticide container disposal sites. All personnel handling or applying herbicides should use protective clothing to minimize exposure. Additional detail on safe handling, use of protective equipment and container disposal is included in this Guide.

READ AND FOLLOW LABEL INSTRUCTIONS.

PRACTICE SAFETY IN USING PESTICIDES.

TRIPLE RINSE OR PRESSURE RINSE CONTAINERS AND DELIVER TO A DESIGNATED PESTICIDE CONTAINER DISPOSAL SITE.

EMERGENCY NUMBERS	
POISON CONTROL CENTRE	1-787-2591
PESTICIDE SPILLS	1-945-4888

This publication is intended to be used as a guide only. Information contained herein is that available at time of printing. While every effort has been made to ensure accuracy, Manitoba Agriculture does not accept responsibility for label changes or errors in conversion. Consult product labels attached to pesticide containers for final detailed instructions.

Certain recommendations in this publication are given in quantity of commercial product per acre (L or kg/acre). Product labels are given in quantity of product per hectare (L or kg/ha). To avoid application errors be sure to read and understand label recommendations.

This information is available in large print, audiotape or braille, upon request.

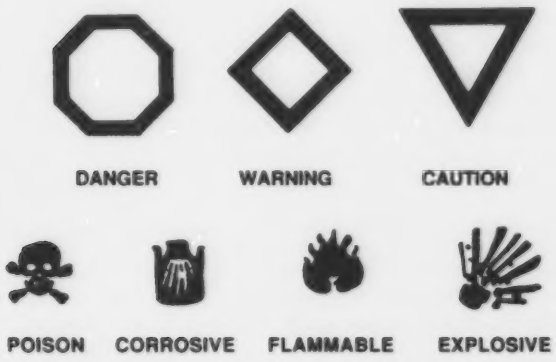
Safe Use of Herbicides and Fungicides

Herbicides and fungicides are classified according to the use hazard and risk involved. The categories of hazard are:

- toxicity
- flammability
- explosive potential
- corrosivity.

The degree of risk is represented by symbols taken from common traffic sign shapes represented by the stop, caution and yield signs. The signal word for each of the signs is danger, warning and caution. Where the risk is minimal, no designation is required. The label on the container will carry the appropriate signs for the protection of the user. Degree of risk symbols for herbicides and fungicides used in field and forage crops are included in the product directory in Section II. The symbols are illustrated in Figure 1.

Figure I. Degree of risk and hazard symbols



Protecting Yourself from Exposure to Herbicides and Fungicides

The use of protective equipment and sound safety procedures will help minimize your exposure to herbicides and fungicides. Follow the 10 rules for safe application listed, and wear the safety equipment recommended.

Ten Rules for Safe Application

1. Never smoke or eat while applying herbicides or fungicides.
2. Avoid inhaling sprays or dusts. Wear protective clothing and a respirator.
3. Sprayer lines carrying chemicals should not enter the operator's cab.
4. Have soap, water and a towel available. Should concentrated product spill on skin, hands, face or eyes, wash immediately.
5. Wash hands and face when leaving the treated area, before break periods, lunch, or urination, etc.
6. Bathe or shower and change to clean clothing after working with pesticides. Wash clothing each day before re-use.
7. Call a physician or get the patient to a hospital immediately if symptoms of illness occur during or shortly after pesticide application. Be sure to take along the product label or container.
8. Store pesticides out of the reach of children and where there is no chance of contact with human food or livestock feeds. Do not store herbicides with insecticides and avoid cross-contamination. Storage areas should be locked.
9. Keep chemicals in their original containers, never in unmarked containers or bottles used for food or drink.
10. Follow proper container disposal methods. All containers should be triple rinsed or pressure rinsed, punctured to render the container non-reusable, and delivered to designated disposal sites.

Protective Clothing

Wear protective equipment as described in the chart to reduce exposure.

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Coveralls	There are two types of coveralls: disposable and reusable. Disposable coveralls are lightweight and comfortable on warm days. They can be worn for mixing and applying pesticides, then discarded at the day's end. If they become contaminated, they should should be discarded at once. The second type of coverall is made of washable fabric and may be reused many times. These fabric coveralls are adequate for use with all but the most highly toxic and concentrated pesticides.	Button (or zip) right up to the neck. Loose coveralls around the neck will suck and blow pesticide in and out of the interior of the coveralls as you bend and move. Wear coveralls over a long-sleeved shirt and pants.
Aprons	When pouring or otherwise handling concentrated pesticides, it is good sense to wear protection in the form of an apron. The apron protects the front of your body from spills or splashes of the concentrate. The apron should be made of rubber or synthetic liquid-proof material that will resist the solvents used in formulating the pesticide.	Make sure the apron covers your body from your chest to your boots.
Gloves	Protect your hands by wearing chemical-resistant gloves. Neoprene gloves provide the best protection. Natural rubber gloves may be used when handling organo-phosphorus or carbamate pesticides. Be sure that they are designed for use with solvents and pesticides. Never use lined gloves, gloves with wristbands or leather gloves.	Put gloves on and roll up the first inch or two of the cuff. That way when you lift your hands, any liquid on the gloves won't drip down your arms.
Hats	Use a chemical-resistant hat, preferably made of washable plastic. The hat may be a hard hat, or it may be made of flexible plastic. In either case, it should have a plastic sweatband. Wash and dry entire hat after each use and before storing. Ordinary baseball caps with cloth sweatbands are dangerous as they absorb the pesticide and recontaminate the forehead each time you wear them. Even small amounts of moderately or slightly toxic pesticides may cause severe skin irritation or other illness if exposure continues for several days.	
Boots	Wear chemical-resistant, unlined boots. These boots are available in a variety of styles and materials. Neoprene boots are the best. Knee-length boots offer greater protection because they extend above the lower end of the apron. Avoid leather or fabric boots and shoes because these will absorb pesticides and cannot be cleaned effectively.	Wear your pant legs outside the top of your boots. This will prevent spills and splashes from running into the boot and on to your leg.

Protecting Your Eyes, Face and Lungs

Wear the following equipment to protect your facial area from exposure:

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Goggles	Chemical-resistant goggles keep your eyes safe from both splashing and, if using dry formulations, dusts or granules. Don't use goggles with cloth or elastic headbands as these will absorb pesticides.	Wear goggles snugly on your face so that the sides of your head are protected from splashes. If you wear glasses, make sure you purchase goggles which fit snugly over them. Never wear contact lenses when working around pesticides.
Respirators	Only NIOSH-approved respirators should be used. Do not exchange parts of different respirators. For example, do not use a cartridge produced by Company "A" with a respirator produced by Company "B" as the combination may not provide adequate protection to the user. Dust masks are ineffective in protecting against herbicide vapours. Similarly, the filters on tractor cabs are intended to remove dust and are not designed to protect against herbicide vapours or mists. Chemical cartridge respirators are recommended for outdoor use when mixing and applying herbicides.	When carrying out operations, filters change each day. The cartridge should be replaced when chemical odour becomes apparent or when breathing becomes difficult. New cartridges should always be installed at the beginning of spray season. Prior to commencing work, check the face seal while the respirator is on the wearer's face. Regardless of design, respirators cannot be worn securely by people wearing beards, moustaches or sideburns.
Face Shields	Goggles offer protection, but frequently full-face protection is advised or required according to the pesticide label. It is especially important to protect your eyes and face when pouring or mixing liquid concentrates. Effective face shields are made of clear plastic.	Since the shields attaches to the hard hat, you can raise or lower as it needed.

Avoiding Spray Drift

To minimize the risk of drift, follow these guidelines:

1. Do not use air-blast or air-mist sprayers to apply herbicides.
2. Do not spray in winds above 20 km/h (12 mph).
3. Avoid using nozzle pressures above 45 psi (300 kPa).
4. Use a minimum of 10 gallons/acre (45 L/acre) water for all herbicides unless otherwise specified for the product.
5. Do not spray when the wind is blowing towards a nearby sensitive crop, shelterbelt or garden.
6. Select nozzles that will produce uniform patterns, correct application rates and low drift hazards. For most conditions, 80° flat fan nozzles produce a better combination of pattern uniformity and drift control than do flooding nozzles, 65° or 73° flat fan nozzles, or cone nozzles.
7. Refer to the Manitoba Agriculture publication "Field Sprayers" and the fact sheet "Calibration and Metric Conversions for Farm Sprayers" for additional information on spraying equipment and calibration.

Container Disposal

Rinse all containers prior to disposal to reduce environmental contamination caused by open dumping of unwanted containers.

Triple Rinsing

Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99.9 per cent free of residues, in most cases. Recent data shows that over 78 per cent of pesticide containers are being rinsed by farmers.

Here are the steps that should be followed:

1. Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
2. Add a measured amount of rinse water or other dilutent so container is about one-fifth full.
3. Rinse the container thoroughly and pour the rinsate into the spray tank.
4. Repeat the procedure two times; it should only take about 5 minutes in total.
5. Triple rinsed containers should be punctured or broken to render them non-reusable. Paper bags should be rinsed once prior to disposal.

Pressure Rinsing

Also available are pressure rinsers that can rinse all sizes of empty pesticide containers that can be lifted into position over the spray tank.

A 30-second rinse with any of these pressure rinsers is convenient and just as effective as triple rinsing.

The pressure rinsers are all constructed to be thrust into the bottom of a metal can or plastic jug. Holes, situated laterally in the rinser tip, direct water from a pressurized source against the inner sides of the container and effectively wash the residual pesticide into the spray tank.

Some farmers have found it convenient to attach a rinser to the pump on their large water storage tank to minimize container handling.

Pressure rinsers have the added advantage of rendering containers useless by automatically puncturing them.

Disposal of Containers

Properly rinsed containers should be delivered to a designated pesticide container disposal site. Contact your ag rep or weed supervisor for the locations of pesticide container disposal sites in your municipality.

How to Identify Crop and Weed Leaf Stages

Recognition of plant growth stages is essential for effective weed and disease control. Many herbicides and fungicides are safe on a crop only when applied at a specific growth stage. Similarly, weeds are controlled only when they are at certain growth stages.

For most post-emergence products, growth stages are described by number of leaves. The following is a description of how to count leaves for staging.

Cereals and Annual Grass Weeds

Leaves are counted, starting at one for the first leaf, and progressing up the primary shoot. Tillers are important but not counted as leaves. A leaf should be counted as soon as it emerges, but may be labelled as early, mid or full leaf. The early stage is when it begins to emerge, the full stage is just before the next leaf emerges.

Tillers, or stools, are the secondary shoots of a grass plant. The first tiller emerges from the axil of the first leaf, the second just above the second leaf and so on. Tillers generally appear at the three-to four-leaf stage. Be sure to identify tillers, and count only leaves on the primary shoot. As well, do not remove any leaves from the main shoot when separating the tillers.

Figure 2. Leaf stages of cereals and annual grass weeds

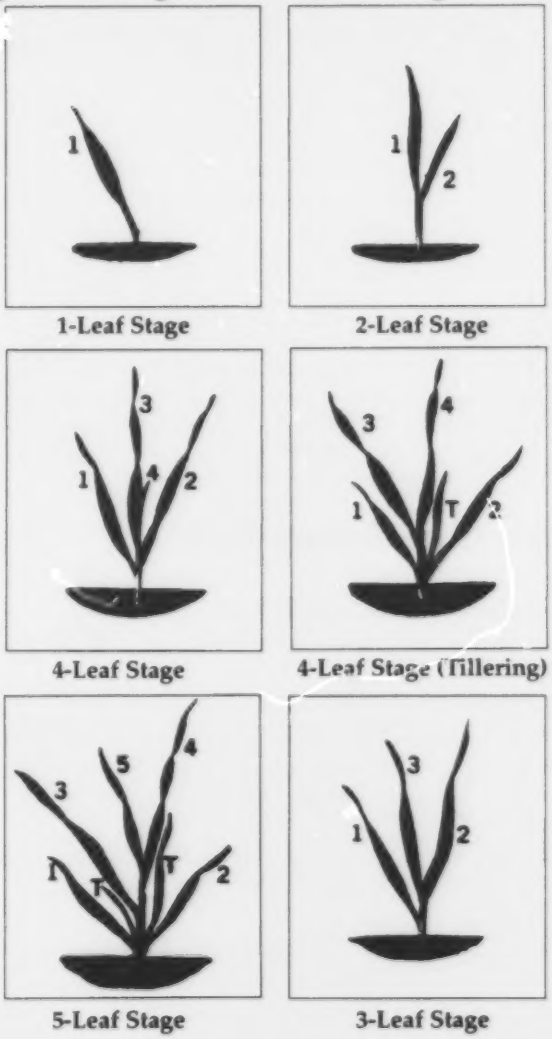
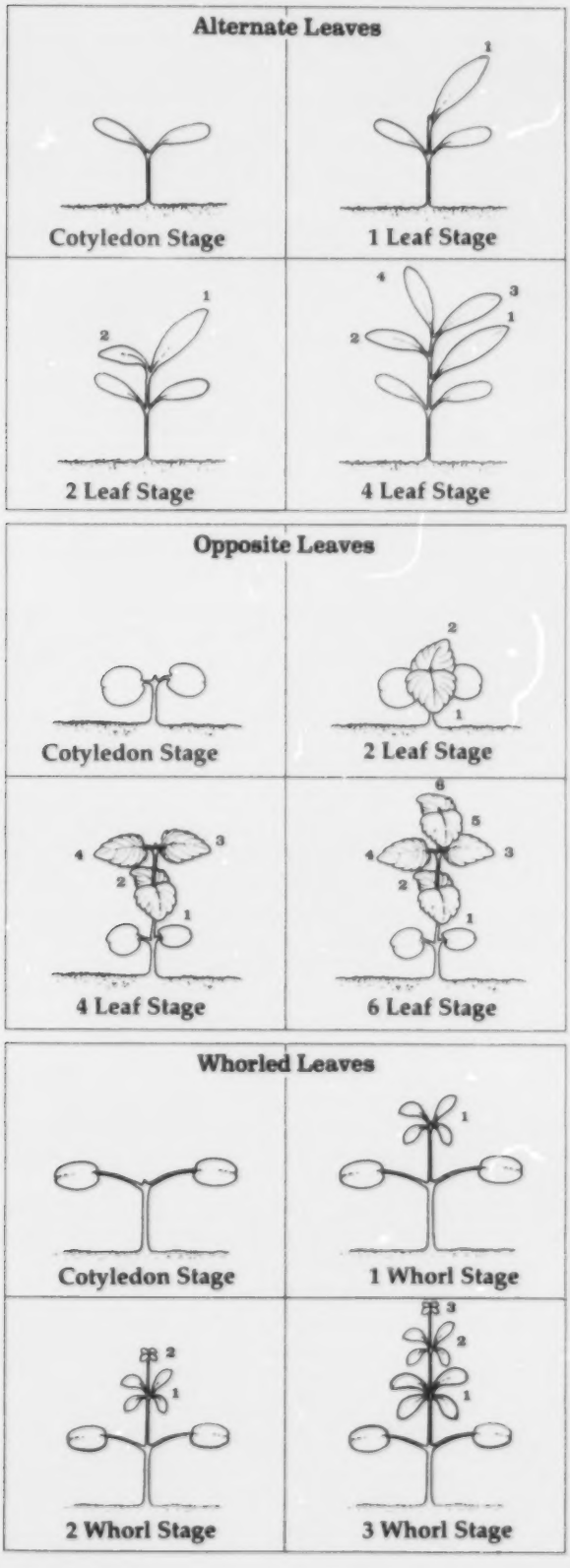


Figure 3. Leaf stages of broadleaf weeds and crops



Broadleaf Weeds

Cotyledons - These are the seed leaves which usually emerge above ground. On some plants, such as fababeans, lentils and peas, they stay below the soil surface. Cotyledons are not true leaves and are not counted when determining leaf number. They are a different shape than the true leaves and may dry up and disappear at an early stage.

Alternate leaves - Some plants have one leaf at each node on the stem. The next leaf emerges at the next higher node and extends away from the stem in the opposite direction. These plants - lamb's quarters and wild mustard are good examples - are said to have alternate leaves. To determine the leaf stage, simply count the number of leaves present (Figure 3).

Opposite leaves - Plants with two leaves at each node, one on each side of the stem, are said to have opposite leaves. The next pair of leaves on the next node are rotated about 45 degrees so that they are not directly over the previous pair. Plants with opposite leaves have even-leaf numbers only. When counting, the leaf number progresses from cotyledons to 2 leaf, 4 leaf, etc. These plants generally appear shorter than plants with alternate leaves at a similar leaf stage. **Be sure to count each pair as two leaves**. Hemp nettle is a weed which has opposite leaves (Figure 3).

Whorled leaves - More complex plants like cleavers may have whorled leaves. These plants have three or more leaves at each node on the stem. The leaf number in each whorl may vary, so be sure to count each individual leaf unless the Guide or label recommendation refers to the number of leaf whorls (Figure 3).

Resistance of Weeds to Herbicides

In recent years, the number of herbicide-resistant weeds and the areas they infest in Manitoba have increased.

Herbicide-resistant weeds arise following repeated use of the same herbicide (or herbicide group) year after year on the same field. Growers who have developed weed resistance on their farms will typically see a weed which is normally controlled by a herbicide, escape uncontrolled after a number of years of use of the same product or product group.

Table 1: Herbicide Resistant Weeds in Western Canada

WEED	DESCRIPTION OF RESISTANCE
Wild oats	Resistant to a group of herbicides which includes Assure, Excel, Fusilade, Fusilade II, HoeGrass 284, HoeGrass II, Poast, Triumph Plus. Typically resistant to 10 to 40 times normal field rates. Resistant to Avadex BW, Fortress and Avenge. Resistant to 1.5 to 4 times field rates.
Green foxtail	Resistant to trifluralin products (Treflan, Rival, Advance, Fortress) and to Edge. Resistant to 4 to 10 times field rates. Resistant to a group of herbicides, which includes Assure, Excel, Fusilade, Fusilade II, Laser, Laser DF, Poast, Triumph Plus. Resistant to 10 to 100 times field rates.
Wild mustard	Resistant to a group of herbicides which includes 2,4-D, MCPA, Banvel, DyVel, DyVel DS, Kil-Mor, Target, Estaprop, Diphenoprop. Resistant to 5 to 100 times the field rates.
Kochia, chickweed and Russian thistle	Resistant to a group of herbicides which includes Glean, Ally, Refine, Laser DF and Triumph Plus. Resistant to 2 to 100 times field rates.

How to Identify Weed Resistance

It is important to avoid confusing herbicide failure due to resistance with herbicide failure due to various other factors (such as weather or application errors). When a herbicide fails to control weeds due to weather or application factors, that herbicide may work in the field the next season. But when herbicides fail due to the development of resistance, they will fail in subsequent years, regardless of weather or application procedures.

Herbicide resistance should be suspected under the following conditions:

- A weed species which the herbicide controlled in previous seasons now escapes the treatment, while other weeds which appear on the label continue to be controlled in the field.
- The escapes cannot be attributed to adverse weather or emergence after application (if a post-emergence product is in question).
- Irregular-shaped patches of a weed develop where the herbicide gives little or no control.
- Records of the past history of the field show repeated use of the same herbicide, or combinations of herbicides, which kill the weed in question in the same way.

Avoiding Weed Resistance

It is far easier to avoid development of resistant weed strains than it is to eradicate or control them after they develop and infest an area.

To avoid the development of resistance on your farm, take the following steps:

1. Rotate herbicide usage so that the same herbicide is not used year after year. Rather than using the same product on an annual basis, consider using other products on a regular basis.
2. Where practical, use tank mixes where both active ingredients within the tank mix may act to kill the same weed using different mechanisms of action.
3. Be aware that when resistance to one product develops in a weed population, it can often mean the weed population has developed resistance to other herbicides which act in a similar manner.

   For example, green foxtail, which is resistant to Trifluralin, may be resistant to Edge as well; kochia which is resistant to Glean or Ally, may be resistant to Refine; wild oat populations resistant to Hoe-Grass 284 may be resistant to Hoe-Grass II, Excel, Fusilade, Fusilade II, Poast and Triumph Plus.

   This means that your long-term herbicide planning should ensure against using products from within the same group of herbicides year after year. Your ag rep, weed supervisor, or local industry representative can provide information on herbicide groups.
4. Keep accurate records of crop rotation and herbicide use. It will be easier to plan your long-term weed management strategies if you have good records of your past management practices.
5. If resistance is suspected, avoid spreading crop seed, weed seed, or crop residues from the affected area. This will minimize spread of the problem.
6. Report suspected cases of resistance on your farm to your ag rep, weed supervisor or industry representative.

Resistance Grouping

To help you plan your herbicide program, the following table lists 'herbicide groups'. To slow down the process of developing weed resistance, use products from different groups from year to year on your fields.

Table 2: Herbicide Groups Based on Mechanism of Action

Group 1 Assure, Excel Super, Fusilade, Fusilade II, Hoe-Grass 284, Hoe-Grass II*, Poast, Laser*, Laser DF*, Refine WO*, Triumph Plus*	**Group 2** Ally, Assert, Glean, Muster, Refine, Triumph Plus*
Group 3 Edge, Rival, Treflan, Triflurex, Fortress*	**Group 4** 2,4-D, MCPA, Banvel, Blagal*, Buctril M*, Diphenoprop 660*, Estaprop*, Dyvel*, Kil-Mor*, Laser*, Laser DF*, Lontrel, Target*, Tordon 202C*, Tropotox Plus*, Triumph Plus*
Group 5 Bladex L, Blagal*, Lexone, Sencor Atrazine.	**Group 6** Buctril M*, Hoe-Grass II*, Pardner, Laser*, Refine WO*
Group 7 Lorox, Afolan	**Other Herbicides** The herbicides Avadex BW, Avenge 280C, Eptam, Mataven, Stampede, TCA and Basagran are in groups of their own.

* **Products contain more than one active ingredient and therefore may appear in more than one group. In some instances, both active ingredients act to kill the same weed using different mechanisms of action. In these instances, use of tank mixes may slow down the process of developing weed resistance.**

New herbicides do not necessarily have a unique mechanism of action and may fall within the groups listed above.

Note: Herbicides that have the same mechanism of action may not control the same weed spectrum or have the same crop safety. For example, Assert and Ally have the same mechanism of action; however, Assert controls wild oats while Ally does not. Remember to read and follow label instructions.

Crop and Herbicide Recommendation Charts

The ratings in the following charts give general comparisons based on rates, timing and other application instructions and precautions as outlined in this Guide.

The ratings for crop tolerance and weed control are explained below. Where ratings are not given, a dot (•) will indicate if the weed is listed on a product label.

Where more than one trade name is listed, not all weeds or tank mixes may appear on all labels. Check the product label for complete details.

All ratings for flixweed, shepherd's purse and stinkweed refer to control of spring seedlings only. Overwintered rosettes will not be controlled.

	Crop Tolerance	Weed Control
E - Excellent	Consistently exhibits a high degree of tolerance over a wide range of growing conditions.	Consistently provides a high degree of control over a wide range of growing conditions.
G - Good	Exhibits acceptable crop tolerance under most growing conditions.	Provides acceptable control under most growing conditions.
F - Fair	Tolerance is variable depending on growing conditions.	Control is variable depending on growing conditions or consistent suppression may be expected.
P - Poor	Tolerance is often unacceptable.	May provide some suppression but control is often unacceptable.

Cost:

Costs for most products are given in price ($)/acre based on 1991 manufacturers suggested retail price. Where a range of rates is recommended the cost is given for the upper and lower rates. Some seed treatment costs are given in price/container as the price/acre will depend on seeding rates. Use these costs as a guide only. Prices for 1992 may differ. Consult your local agricultural chemical dealer for current prices.

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Table 1. Weed Control in Barley

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Rapeseed	Volunteer Sunflowers
Avadex BW	36	E			G																						
Avadex BW + Rival/Treflan/Triflurex	36	E		G	G																						
Afolan/Lorox + MCPA	28	F		P		G		G		G	E	F	G	E	E	G			E	F	E						
Ally + 2,4-D	30	G				F		G			E	G	G	E	E	E		G	E	G	E	F	F			G	
Assert 300	31	G			G	P									G						G						
Assert + MCPA ester	31	G			F	P				G	E			E	E				E		E						
Assert + 2,4-D ester	31	G			F	P								F	G						G						
Avenge	40	G			G																						
Avenge + Buctril M	40	G			G	E	F			G	G		G	E	E	G		G	G	G	G	P	P			F	F
Avenge + Diphenoprop 600/Estaprop	40	G			G	G	G			G	E		G	E	E	G		G	E	G	E	F	F		P	G	G
Avenge + MCPA ester/2,4-D ester	40	G			G					G	E			E	E			G	E		E	P	P				P
Avenge + Pardner	40	G			G	G	P			F			F	G	F	F		G		G	F						
Avenge + Refine	40	G			G	G		G				E	F	E	E	E		G		E	G					G	
Banvel + MCPA/2,4-D	41	F				G			G	G	E	F	G	E	E	G		G	E	G	E	F	F		P	G	F
Blagal	48	G				G		G			G	F		E	E				G	G	G		P				
Buctril M	49	E				E	F	F		G	G		G	E	E	G		G	G	G	G	P	P			F	F
Buctril M + MCPA	49	E				E	F	F		G	E		G	E	E	G		G	G	G	G	P	P			G	G
Diphenoprop/Estaprop	52	G				G	G			G	E		G	E	E	G		G	E	G	E	F	F		P	G	G
DyVel	54	F				G			F	G	E	F	G	E	E	G		G	E	G	E	F	F				F
Fortress	63	G		G	G																						
Hoe-Grass 284	68	G	G	G	G																			F			
Hoe-Grass II	70	G	G	G	G	G							F	G	F	F		G		G	F			F			
Hoe-Grass II + MCPA amine	70	G	F	F	F	G							F	G	F	F		G		G	F			F			
Hoe-Grass 284 + Pardner	68	G	G	G	G	G	P			F			F	G	F	F		G		G	F						
Hoe-Grass 284 + Refine	68	G			G	G		G				E	F	E	E	E		G		E	G					G	
Kil-Mor	72	F				G			G	G	E			E	E	G		G	E	G	E	F	F		P		
Lexone/Sencor	78	F					G	G				F		G	G	F		G		G	G					G	
Lexone/Sencor + 2,4-D amine/MCPA	78	F					G	G			E	F		E	E	G		G	E	G	E	P	P			G	
Lexone/Sencor + Banvel	78	F				G	G	G				F		G	G	G		G		G	G	F	F			G	
Lontrel	80	G				F																F	F				
Lontrel + MCPA/2,4-D	80	G				F				G	E			E	E			G	E		E	F	F		P		
MCPA	83	E								G	E			E	E				E		E	P	P				P
MCPAK	83	E								G	E	F		E	E				E		E	P	P				
Pardner	87	E				G	P			F			F	G	F	F		G		G	F						
Pardner + MCPA/2,4-D	87	E				E	F			G	G	F	G	E	E	G		G	G	G	G	P	P				F
Refine	91	E				G		G				E	F	E	E	E		G		E	G					G	
Refine + MCPA Amine	91	E				G		G				E	F	E	E	E		G		E	G		P			G	
Roundup/Laredo/Wangler - pre to crop	96	*		G	G	F							G	G	G	G	G	G	G	G							
Stampede 360 + MCPA ester	99	F		G		G					G		F	E	G	G			G	G	G					G	
Stampede CM	99	F		G		G					G		F	E	G	G			G	G	G					G	
Target	101	F				G	G		G		E	P	G	E	E	G		G	E	G	E	F	F			G	F
TCA	103	F		F																							
TCA + MCPA/2,4-D	103	F		F						G	E			E	E			G	E		E	P	P				P
TCA + Buctril M	103	F		F		E	F			G	G		G	E	E	G		G	G	G	G	P	P			F	F
Tordon 202 C	104	G				G				G				E	E	G		G		G	E	P	P				
Trifluralin (liquid formulations)	105	E		G																							
Trifluralin (granular formulations)	107	F	G	G	F	F		G						G		G		G									
2,4-D	27	G								G	E			E	E			G	E		E	P	P		P		P

* May be used in-crop for patch treatment; will destroy crop within sprayed area.

Table 2. Weed Control in Oats

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Rapeseed	Volunteer Sunflowers
Afolan/Lorox + MCPA	28	F		P		G		G		G	E	F	G	E	E	G			E	E	E				G	F
Banvel + MCPA	41	F				G			G	G	E	F	G	E	E	G		G	E	G	E	F	F		G	F
Blagal	48	G				G		G			G	F		E	E				G	G	G		P			
Buctril M	49	E				E	F			G	G		G	E	E	G		G	G	G	G	P	P		F	F
DyVel	54	F				G			F	G	E	F	G	E	E	G		G	E	G	E	F	F			F
Kil-Mor	72	F				G			G	G	E			E	E	G		G	E	G	E	F	F	P		
Lontrel	80	G				F																F	F			
Lontrel + MCPA	80	G				F				G	E			E	E				E		E	F	F			
MCPA	83	E								G	E			E	E				E		E	P	P			P
MCPAK	83	E								G	E	F		E	E				E		E	P	P			
Pardner	87	E				G	P			F			F	G	F	F		G		G	F					
Pardner + MCPA	87	E				E	F			G	G	F	G	E	E	G		G	G	G	G	P	P			F
Refine	91	E				G		G				E	F	E	E	E		G		E	G				G	
Refine + MCPA amine	91	E				G		G				E	F	E	E	E		G		E	G		P		G	
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	F							G	G	G	G	G	G	G	G						
Stampede 360 + MCPA Ester	99	F		G		G					G		F	E	G	G			G	G	G				G	
Stampede CM	99	F		G		G					G		F	E	G	G			G	G	G				G	
Target	101	F				G	G		G		E	P	G	E	E	G		G	E	G	E	F	F		G	F
TCA	103	F		F																						
TCA + MCPA	103	F		F						G	E			E	E				E		E	P	P			P
TCA + Buctril M	103	F		F		E	F			G	G		G	E	E	G		G	G	G	G	P	P		F	F

* May be used in-crop for patch treatment; will destroy crop within sprayed area.

Table 3. Weed Control in Rye

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Rapeseed	Volunteer Sunflowers
Avenge	40	G			G																						
Banvel + 2,4-D	41	F				G			G	G	E		G	E	E	G		G	E	G	E	F	F		P	G	G
Buctril M	49	E				E	F			G	G		G	E	E	G		G	G	G	G	P	P			F	F
Hoe-Grass 284	68	G	G	G	G																			F			
Hoe-Grass II	70	G	G	G	G	G							F	G	F	F		G		G	F			F			
Hoe-Grass II + MCPA amine	70	G	F	F	F	G							F	G	F	F		G		G	F			F			
MCPA	83	E								G	E			E	E				E		E	P	P				P
Pardner	87	E				G	P			F			F	G	F	F		G		G	F						
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	F							G	G	G	G	G	G	G	G							
2,4-D	27	G								G	E			E	E			G	E		E	P	P		P		

*Do not apply after crop emergence

Table 4. Weed Control in Triticale

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Rapeseed	Volunteer Sunflowers
Avenge	40	G			G																						
Hoe-Grass 284	68	G	G	G	G																			F			
Hoe-Grass 284 + Pardner	68	G	G	G	G	G	P			F			F	G	F	F		G		G	F			F			
Hoe-Grass II	70	G	G	G	G	G							F	G	F	F		G		G	F			F			
Hoe-Grass II + MCPA amine	70	G	F	F	F	G							F	G	F	F		G		G	F			F			
Mataven L	81	E			G																						
Pardner	87	E				G	P			F			F	G	F	F		G		G	F						
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	F							G	G	G	G	G	G	G	G							

*Do not apply after crop emergence

Table 5. Weed Control in Winter Wheat

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Rapeseed	Volunteer Sunflowers
Avenge	40	G			G																						
Banvel + MCPA or 2,4-D	41	F				G			G	G	E	F	G	E	E	G		G	E	G	E	F	F		P	G	F
Buctril M	49	E				E	F			G	G		G	E	E	G		G	G	G	G	P	P			F	F
Diphenoprop 600/Estaprop	52	G				G	G			G	E		G	E	E	G		G	E	G	E	F	F		P	G	G
Dyvel	54	F				G			F	G	E	F	G	E	E	G		G	E	G	E	F	F				F
Hoe-Grass 284	68	G	G	G	G																			F			
Hoe-Grass 284 + Refine	68	G			G	G		G				E	F	E	E	E		G		E	G					G	
Kil-Mor	72	F				G			G	G	E			E	E	G		G	E	G	E	F	F		P		
Mataven L	81	G			G																						
MCPA	83	E								G	E			E	E				E		E	P	P				P
Pardner	87	E				G	P			F			F	G	F	F		G		G	F						
Pardner + MCPA/2,4-D	87	E				E	F			G	G		G	E	E	G		G	G	G	G	P	P				F
Refine	91	E				G		G				E	F	E	E	E		G		E	G					G	
Refine + MCPA Amine	91	E				G		G				E	F	E	E	E		G		E	G		P			G	
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	F							G	G	G	G	G	G	G	G							
Target	101	F				G	G		G		E	P	G	E	E	G		G	E	G	E	F	F			G	F
2,4-D	27	G								G	E			E	E			G	E		E	P	P		P		

*Do not apply after crop emergence

Table 6. Weed Control in Spring Wheat

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Corn	Volunteer Flax	Volunteer Mustard, Rapeseed	Volunteer Sunflowers
Avadex BW	36	G			G																						
Avadex BW + Trifluralin (liquid formulations)	36	E		G	G																						
Afolan/Lorox + MCPA	28	F		P		G		G		G	E	F	G	E	E	G			E	F	E						
Ally + 2,4-D	30	G				F	G				E	G	G	E	E	E		G	E	G	E	F	F			G	
Assert 300**	31	G			G	P									G						G						
Assert 300 + 2,4-D LV ester**	31	G			F	P								G	G						G						
Assert 300 + MCPA ester**	31	G			F	P				G	E			E	E				E		E						
Avenge**	40	G			G																						
Avenge + Buctril M**	40	G			G	E	F			G	G		G	E	E	G		G	G	G	G	P	P			F	F
Avenge + Diphenoprop 600/Estaprop**	40	G			G	G	G			G	E		G	E	E	G		G	E	G	E	F	F		P	G	G
Avenge + MCPA ester/2,4-D ester**	40	G			G					G	E			E	E			G	E		E	P	P				P
Avenge + Pardner**	40	G			G	G	P			F			F	G	F	F		G		G	F						
Avenge + Refine**	40	G			G	G		G				E	F	E	E	E		G		E	G					G	
Banvel + MCPA or 2,4-D	41	G				G			G	G	E	F	G	E	E	G		G	E	G	E	F	F		P	G	F
Blagal	48	G				G		G			G	F		E	E				G	G	G		P				
Buctril M	49	E				E	F	F		G	G		G	E	E	G		G	G	G	G	P	P			F	F
Buctril M + MCPA/MCPAK	49	E				E	F	F		G	E	F	G	E	E	G		G	G	G	G	P	P			G	G
Diphenoprop 600/Estaprop	52	G				G	G			G	E		G	E	E	G		G	E	G	E	F	F		P	G	G
DyVel	54	G				G			F	G	E	F	G	E	E	G		G	E	G	E	F	F				F
DyVel DS	56	G				G			F	G	E	F	G	E	E	G		G	E	G	E	F	F				
Fortress	63	F		G	G																			F			
Hoe-Grass 284	68	G	G	G	G																			F			
Hoe-Grass 284 + Pardner	68	G	G	G	G	G	P						F	G	F	G		G		G	F			F			
Hoe Grass 284 + Refine	68	G			G	G		G				E	F	E	E	E		G		E	G					G	
Hoe-Grass II	70	G	G	G	G	G							F	G	F			G		G	F			F			
Hoe-Grass II + MCPA amine	70	G	F	F	F	G							F	G	F			G		G	F			F			
Kil-Mor	72	G				G			G	G	E			E	E	G		G	E	G	E	F	F		P		
Laser**	75	F		G		E	F			G	G		G	E	E	G		G	G	G	G	P	P				
Laser DF**	76	G		G		G		G		G	G	E	F	E	E	E		G	G	G	G	P	P			G	
Lexone/Sencor	78	F					G	G				F		G	G	F		G		G	G					G	
Lexone/Sencor + MCPA or 2,4-D	78	F					G	G		G	E	F		E	E	G		G	E	G	E	P	P			G	
Lexone/Sencor + Banvel	78	F				G	G	G				F		G	G	G		G		G	G	F	F			G	
Lontrel	80	G				F																F	F				
Lontrel + MCPA/2,4-D	80	G				F				G	E			E	E				E		E	F	F				
Mataven L**	81	E			G																						
MCPA	83	E								G	E			E	E				E		E	P	P				P
MCPAK	83	E								G	E	F		E	E				E		E	P	P				
Pardner	87	E				G	P			F			F	G	F	F		G		G	F						
Pardner + MCPA/2,4-D	87	E				E	F			G	G	F	G	E	G	G		G	G	G	G	P	P				F
Refine	91	E				G		G				E	F	E	E	E		G		E	G					G	
Refine + MCPA Amine	91	E				G		G				E	F	E	E	E		G		E	G		P			G	
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G								G	G	G	G	G	G	G	G							
Stampede CM or Stampede 360 + MCPA ester	99	F		G		G					G		F	E	G	G			G	G	G					G	
Target	101	G				G	G		G		E	P	G	E	E	G		G	E	G	E	F	F			G	F
Tordon 202 C	104	G				G				G				E	E	G		G		G	E	P	P				
Trifluralin (liquid formulations)	105	E		G																							
Trifluralin (granular formulations)	107	F		G																							
Triumph Plus**	110	G		G	G	G		G		G	E	E	F	E	E	E		G	E	E	E					G	
2,4-D	27	G								G	E			E	E			G	E		E	P	P		P		

* May be used in-crop for patch treatment; will destroy crop within sprayed area.

**Not recommended for all wheats/wheat varieties. Check product listing for details.

Table 7. Weed Control in Corn

HERBICIDE	PAGE	Barnyard Grass	Cereal Grains	Foxtail, Green	Foxtail, Yellow	Wild Oats	Quack Grass	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Kochia	Lamb's-Quarters	Mustard, Wild	Pigweed, Red Root	Rapeseed, Volunteer	Russian-thistle	Shepherd's Purse	Annual Smartweed Species, Lady's Thumb	Sow Thistle (Perennial)	Stinkweed	Sunflower, Volunteer	Thistle, Canada
Atrazine	34					•		•							•	•	•				•				
Basagran	43										•				•	•	•		•		•				
Banvel	41							•			•			•		•	•				•				
Banvel plus 2,4-D amine	41							•			•	•	•		•	•	•		•	•	•		•		
Bladex	46	•		•	•			•				•			•	•	•		•	•	•				
Bladex + Bio-Veg	46	•		•	•			•							•	•	•		•	•	•				
Bladex + Dual	46	•		•	•			•							•	•	•		•	•	•				
Bladex + Eradicane	46	•	•	•	•	•		•							•	•	•		•	•	•				
Buctril M	49							•		•		•	•	•	•	•	•	•	•	•	•		•	•	
Dual	53	•		•	•										•		•		•	•					
Eradicane	60	•	•	•	•	•	S				•						•								
Eradicane plus Atrazine	60	•	•	•	•	•	S				•					•	•				•				
Kil-Mor	72							•				•	•		•	•	•		•	•	•		•		
Laddock	73										•	•			•	•	•		•		•		•		
Pardner	87							•	•			•			•	•			•		•		•		
Roundup/Laredo/Wrangler - pre to crop	96	*		•	•	•	•	•						•	•	•	•		•	•	•				
2,4-D	27											•	•		•	•			•	•			•	S	

* May be applied in-crop as patch treatment; will destroy crop within sprayed areas.

• controlled

S suppression

Table 8. Weed Control in Peas (Field and Processing)

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Avadex BW	36	E			G																				
Basagran	43	F						F		F				F	F			F	F	F	F		P		
Edge	57	G	E	E	G	G		G	F			F	G	E		G		F		F				F	G
Edge + Sencor	57	G	E	E	G	G	F	G	F			F	G	E	F	G		F		G	F			F	G
Excel Super	62	E	G	G	G																			G	
Hoe-Grass 284	68	G	G	G	G																				
Lexone/Sencor	78	F					F	F				F		F	F	F		F		F	F				
MCPA Sodium Salt	83	F									P			P	G				P		P				
Poast	88	E	E	E	G												F							G	G
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	F							G	G	G	G	G	G	G	G					
TCA	103	G		F																					
TCA + MCPA Sodium Salt	103	F		F							P			P	G				P		P				
Treflan + Sencor	107	G	G	G	F	F		G				F		G	G	G		G	G	G	G				
Trifluralin	107	G	G	G	F	F		G						G		G		G							
Tropotox Plus	112	F										F		G	G	G			G		G	P	P		

*Do not apply after crop emergence

Table 9. Weed Control in Flax

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Avadex BW	36	E				G																				
Assure	33	E	G	E		G												F							G	G
Basagran	43	F							F		F				F	F	P			F	F	F		F		
Buctril M	49	F					E	F			G	G		G	E	E			G	G	G	G	P	P		
Excel Super	62	E	G	G	G	G																			G	
Eptam	59	F	G	G	G	G			G						G		G								F	F
Fortress	63	G		G	G	G																				
Fusilade/Fusilade II	65	E	E	F	F	G												F							E	E
Fusilade/Fusilade II + Poast	65	E	G	E	E	G																			E	E
Hoe-Grass 284	68	G	G	G	G	G																				
Hoe-Grass II	70	F	G	G	G	G	G	P						F	G	F	P		G		G	F				
Lontrel	80	G					F																F	G		
Lontrel + MCPA	80	F					F				G	E			E	E				E		E	P	P		
MCPA/MCPAK	83	F									G	E	F		E	E				E		E	P	P		
Poast	88	E	E	E	E	G												F							G	G
Poast + Buctril M	88	F	G	G	G	G	E	F			G	G		G	E	E		F	G	G	G	G	P	P	G	G
Poast + MCPA amine or ester	88	F	G	G	G	G					G	E			E	E				E		E	P	P	G	G
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	G	F							G	G	G	G	G	G	G	G					
Roundup - Pre-harvest	96	F																F						F		
Stampede 360 + MCPA ester	99	F		G	G		G					G		F	G	G	G			G	G	G				
Stampede CM	99	F		G	G		G					G		F	G	G	G			G	G	G				
TCA	103	G		F	F																					
TCA + MCPA	103	F		F	F						G	E	F		E	E				E		E	P	P		
Trifluralin	107	F	G	G	G	F	F		G						G		G		G							

*Do not apply after crop emergence

Table 10. Weed Control in Mustard

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Avadex BW	36	E			G																				
Edge	57	G	E	E	G	G		G	F			F	G	E		E		F		F				F	G
Excel Super	62	E	G	G	G																			G	
Fortress	63	G		G	G																				
Hoe-Grass 284	68	G	G	G	G																				
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	F							G	G	G	G	G	G	G							
Trifluralin	107	E	G	G	F	F		G						G		G		G								

*Do not apply after crop emergence

Table 11. Weed Control in Rapeseed (including canola)

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Assure	33	E	G	E		G												F							G	G
Assure + Muster	33	G	G	E		G						G	G			G	P	F			G	F			G	G
Avadex BW	36	E				G																				
Edge	57	G	E	E	E	G	G		G	F			F	G	E		E		F		F				F	G
Excel Super	62	E	G	G	G	G																			G	
Excel Super + Lontrel	62	E	G	G	G	G	F																F	F	G	
Fortress	63	G		G	G	G																				
Fusilade	65	E	E			G																			E	E
Fusilade II	65	E	E	F	F	G												F							E	E
Fusilade + Lontrel	65	G	E			G	F																G	E	E	E
Fusilade II + Lontrel	65	G	E	F	F	G	F											F					G	E	E	E
Fusilade/Fusilade II + Poast	65	E	G	E	E	G																			E	E
Hoe-Grass 284	68	G	G	G	G	G																				
Hoe-Grass 284 + Lontrel	68	G	G	G	G	G	F																F	F		
Lontrel	80	G					F																G	E		
Muster	85	G										G	G			G	P				G	F				
Poast	88	E	E	E	E	G												F							G	G
Poast + Lontrel	88	G	E	E	E	G	F											F					G	E	G	G
Poast + Muster	88	G	E	E	E	G						G	G			G	P	F			G	F			G	G
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	G	F							G	G	G	G	G	G	G	G					
TCA	103	G		F	F																					
Trifluralin	107	E	G	G	G	F	F		G						G		G		G							

*Do not apply after crop emergence

Table 12. Weed Control in Potatoes

HERBICIDE	PAGE	Barnyard Grass	Foxtail, green and yellow	Wild Oats	Quackgrass	Chickweed	Hemp Nettle	Lamb's Quarters	Mustard, Wild	Pigweed, red root	Pigweed, prostrate	Purslane	Smartweed (Annual)	Shepherd's Purse	Stinkweed	Volunteer Corn	Volunteer Barley	Volunteer Wheat	Volunteer Rapeseed	Volunteer Triazine Tolerant Canola
Dual	53	•	•																	
Eptam 8-E	59	•	•	•	S	•		•		•	•	•					•	•		
Eptam + Lexone/Sencor	59	•	•	•	S	•	•	•	•	•	•	•	•	•	•		•	•		
Excel Super	62	•	•	•													•			
Fusilade/Fusilade II	65	•	•	•	S											•	•	•		
Gramoxone	67	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Hoe-Grass 284	68	•	•	•																
Poast	88	•	•	•	S											•	•	•		
Roundup/Laredo/Wrangler - pre to crop*	96		•	•					•				•		•		•	•		
Sencor/Lexone	78					•		•		•			•	•	•				•	

* Do not apply after crop emergence
• Controlled
S Suppression

Table 13. Weed Control in Triazine Tolerant Canola

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat	Volunteer Flax
Assure	33	E	G	E		G							G			G	P	F			G	F			G	G	
Assure + Muster	33	G	G	E		G						G	G			G	P	F			G	F			G	G	
Avadex BW	36	E				G																					
Bladex	46	G					G		G	G			F		G	G	F			G	G	G					F
Edge	57	G	E	E	E	G	G		G	F			F	G	E		E		F		F				F	G	
Excel Super	62	E	G	G	G	G																			G		
Excel Super + Bladex	62	G	G	G	G	G	G		G	G			F		G	G	F			G	G	G			G		F
Excel Super + Lontrel	62	G	G	G	G	G	F																F	F	G		
Fortress	63	G		G	G	G																					
Fusilade	65	E	E			G																			E	E	
Fusilade II	65	E	E	F	F	G												F							E	E	
Fusilade + Bladex	65	G	E			G	G		G	G			F		G	G	F			G	G	G			E	E	F
Fusilade II + Bladex	65	G	E	F	F	G	G		G	G			F		G	G	F	F		G	G	G			E	E	F
Fusilade + Lontrel	65	G	E			G	F																G	E	E	E	
Fusilade II + Lontrel	65	G	E	F	F	G	F											F					G	E	E	E	
Fusilade/Fusilade II + Poast	65	E	G	E	E	G																			E	E	
Hoe-Grass 284	68	G	G	G	G	G																					
Hoe-Grass 284 + Lontrel	68	G	G	G	G	G	F																F	F			
Lontrel	80	G					F																G	E			
Muster	85	G										G	G			G	P				G	F					
Poast	88	E	E	E	E	G												F							G	G	
Poast + Bladex	88	G	E	E	E	G	G		G	G			F		G	G	F	F		G	G	G			G	G	F
Poast + Lontrel	88	G	E	E	E	G	F											F					G	E	G	G	
Poast + Muster	88	G	E	E	E	G						G	G			G	P				G	F			G	G	
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	G	F							G	G	G	G	G	G	G	G							
Sencor (postemergence)	78	G							G				F		G	G	F			G	G	G						
Sencor + Treflan/Rival	78	G	G	G	G	F	F		G				F		G	G	G		G	G	G	G						
TCA	103	G		F	F																						
Trifluralin	107	E	G	G	G	F	F		G						G		G		G								

*Do not apply in-crop

Table 14. Weed Control in Sunflowers

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Edge	57	G	E	E	G	G		G	F			F	G	E		E		F	F				F	G
Eptam	59	G	G	G	G			G						G		G							F	F
Excel Super	62	E	G	G	G																		G	
Fusilade/Fusilade II	65	E	E	F	G												F						E	E
Hoe-Grass 284	68	G	G	G	G																			
Mataven L	81	E			G																			
Roundup/Laredo/Wrangler - pre to crop	96	*		G	G	F							G	G	G	G	G	G	G					
Trifluralin	107	E	G	G	F	F		G						G		G		G						

*Do not apply in-crop.

Table 15. Weed Control in Other Special Crops

		CROP								WEED																				
HERBICIDE	PAGE	Beans, Dry	Buckwheat	Canary Seed	Fababeans	Lentils	Safflower	Soybeans	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Wild Oats	Buckwheat, Wild	Catchfly, Night Flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Barley	Volunteer Wheat
Assure	33							X		E		G												F						G	G
Avenge	40			X								G																			
Banvel + MCPA	41			X									G			G	G	E	F	G	E	E	G		G	E	G	E	F	F		
Basagran	43	X			X			X							F		F				F	F			F	F	F	F		P		
Buctril M	49			X									E	F			G	G		G	E	E	G		G	G	G	G	P	P		
Dual	53							X	G	G	G																					
Excel Super	62					X			G	G	G	G																			G	
Edge	57	X			X		X	X	E	E	E	G	G		G	F			F	G	E		G		F		F				F	G
Eptam	59	X							G	G	G	G			G						G		G								F	F
Fusilade/Fusilade II	65							X	E	F	F	G												F							E	E
Hoe-Grass 284	68	X	X		X	X		X	G	G	G	G																				
Mataven L	81			X								G																				
Pardner	87			X									G	P			F			F	G	F	F		G		G	F				
Poast	88	X			X	X		X	E	E	E	G												F							G	G
Roundup/Laredo Wrangler - pre to crop	96	*	*	*	*	*	*	*		G	G	G	F							G	G	G	G	G	G	G	G	G				
Sencor (post emergence)	78					X								G	G				F		G	G	F		G		G	G				
Stampede CM	99			X						G	G		G							F	E	G	G			G	G	G				
Target	101			X									G	G		G			E	P	G	E	E	G		G	E	G	E	F	F		
Treflan + Sencor/Lexone	78				X				G	G	G	F	F		G				F		G	G	G			G	G	G	G				
Trifluralin	107	X				X			G	G	G	F	F		G						G		G			G						

*Do not apply after crop emergence

Table 16. Weed Control in Summerfallow (Chem Fallow)

HERBICIDE	PAGE	Buckwheat, Wild	Flixweed	Foxtail Barley	Foxtail, Green	Kochia	Lady's Thumb	Lamb-s Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Stinkweed	Thistle, Canada	Thistle, Sow	Volunteer Cereals	Volunteer Rapeseed	Wild Oats
Banvel (Pre-bud Canada Thistle)	41													S				
Banvel + 2,4-D	41	•	•			•	•	•	•	•		•	•	S	S		•	
Banvel plus Roundup	96	S	•	S	•	•	•	•	•	S		•	•	S	S	•	•	•
Kil-Mor	72	•	•			•	•	•	•	•		•	•	S	S		•	
Lontrel	80													•	S			
MCPA amine/MCPA Sodium Salt	83		•				•	•				•	S	S			•	
Roundup/Laredo/Wrangler	96			S	•		•		•		•		•	S	S	•	•	•
Roundup/Laredo/Wrangler + Pardner	96	•		S	•		•		•				•			•	•	
Roundup/Laredo/Wrangler + 2,4-D amine	96		•	S	•	•	•		•	•			•			•	•	•
Rustler	98	•	•	S	•	•	•	•	•	•		•	•	S	S	•	•	•
Sweep	100			S	•											•		
Sweep + Afolan/Lorox + MCPA amine	100	•	•	S	•	•	•	•	•	•			•			•	•	•
Sweep + Buctril M	100	•	•	S	•	•	•	•	•	•		•	•			•	•	•
Sweep + Banvel + 2,4-D amine	100	•	•	S	•	•	•	•	•	•		•	•			•	•	•
Sweep + MCPA	100		•	S	•			•	•				•			•	•	•
Sweep + 2,4-D	100		•	S	•			•	•			•	•			•	•	•
Target	101	S	•			•	•	•	•	S		•	•	S	S			

• Controlled
S Suppression

Table 17. Weed Control in Fall Stubble

HERBICIDE	PAGE	Flixweed	Narrow Leaved Hawk's Beard	Shepherd's Purse	Stinkweed	Canada Thistle	Quackgrass
Banvel	41					S	
Banvel + Roundup	96	•		•	•	S	•
Cobutox/Embutox	50		•				
Kil-Mor	72	•		•	•	S	
MCPA amine/MCPA Sodium Salt	83	•		•	•	S	
Lontrel	80					•	
Roundup/Laredo Wrangler	96					S	•
Target	101	•		•	•	S	
2,4-D	27	•		•	•	S	

Table 18. Weed Control in Pastures and Hayfields

HERBICIDE	RATE (L/acre)	PAGE	Absinthe	Bindweed, Field	Bladder Campion	Burdock	Canada Thistle	Cinquefoil	Dock, Curled	Daisy, English	Flixweed	Foxtail-Barley	Gumweed	Hawk's Beard, Narrow Leaved	Knapweed	Leafy Spurge	Nodding Thistle	Poplar	Pussy Toes	Red Bartsia	Sage, Pasture	Sow Thistle	Snowberry	Stinkweed	Tansy	Willow	Yarrow
Banvel	0.84	41		□			□		□	□	•					□						□		•			
Banvel	1.86	41		□			□		□	□	•				□	□						□		•			
Banvel + 2,4-D	0.84 + 0.89	41		□			□		□	□	•					□					□	□		•			
Banvel + 2,4-D	0.84 + 1.62	41	□	□			□		□	□	•					□						□		•		□	
Cobutox/2,4-D B Butyric	1.11 - 1.42	50		□			□		■		•					□		□			□	□		•			
Embutox 625	0.71 - 0.91	50		□			□		■					■								□					
Kerb	0.364 - 0.445	71										•		■								□					
2,4-D (500 g/L)	0.57 - 0.81	27				•					•		□							•			•				
2,4-D (500 g/L)	0.91	27		□		•	□		□		•		□				□			•		□		•			
2,4-D (500 g/L)	1.82	27	□	□		•	□		•		•		□			□	□	□	□	•	□	□	□	•		□	

• Controlled.
■ Controlled by the highest rate within this range.
□ Top growth suppression.

Table 19. Weed Control in Shelterbelts

HERBICIDE	PAGE	USE: Before Planting	USE: After planting (new & Established)	USE: Established	SHELTERBELT SPECIES: American Elm	Birch	Caragana	Crabapple	Green Ash	Juniper	Lilac	Manitoba Maple	Poplar	Scots Pine	Siberian Elm	Willow	WEEDS: Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp Nettle	Kochia	Lamb's Quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada
Afolan/Lorox	28			•	•		•					•					•	•		•	•			•											
Gramoxone	67		•		•	•	•	•	•	•	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Princep Nine-T/Simadex 80W/ Simazine 80W	90			•	•		•		•			•			•		•		•	•	•			•	•	•	•	•	•			•	•	•	
Roundup	96	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				•		•	•	•	•	•		•	•			
Trifluralin Liquids	107	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•					•	•		•		•					

Table 20. Aquatic Weed Control in Farm Dugouts & Ponds*

HERBICIDE	PAGE	Canada Water Weed	Chara	Coontail	Duckweed	Water Milfoil	Algae	Pondweed	Naiads
Copper Sulphate	51						•		
Princep Nine-T	90	•		•	•	•	•	•	•
Simazine 80W	90	•		•	•	•	•	•	•
Reglone A	95	•		•	•	•		•	

* Bodies of water must be wholly contained within the farm property.

2,4-D

Formulations:

500 g/L 2,4-D amine formulated as a solution; 600 g/L or 700 g/L 2,4-D ester formulated as an emulsifiable concentrate.

Container sizes - various.

Crops:

Wheat, barley, spring and fall rye, winter wheat, field corn, established grass pastures, turf, fall stubble.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

CROP	STAGE
Wheat, barley, spring rye	4 leaf to early shot blade
Fall rye, winter wheat	Spring application only, after full tillering but before flag leaf stage.
Corn	Apply as an overall spray before corn is 6 inches (15 cm) tall and before the 6 leaf stage. After 6 inches (15 cm) use a directed spray.
Established grass pastures	No restrictions, apply when weeds are actively growing.
Turf	Apply in spring and early September on established turf. Do not use on bent grasses.

Weed Stage:

2 to 4 leaf stage.

Canada thistle (fall stubble) when plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth.

Weed Resistance Note:

Manitoba producers have reported wild mustard populations that are resistant to a group of herbicides including 2,4-D. These populations of wild mustard developed following use of Group 4 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$1.99 to 2.77/acre (1991 suggested retail price).

Rates:

Wheat, barley, spring rye - 0.51 to 0.71 L/acre of formulations containing 470 g/L. Use the higher rates under dry or cool weather conditions, with heavy weed infestations or for Canada thistle top growth suppression.

Winter wheat, fall rye - 0.405 L/acre.

Corn - 0.283 - 0.445 L/acre.

Pastures - 0.57 - 1.82 L/acre.

Canada thistle (fall stubble) - 0.91 L/acre.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Best weed control occurs when temperatures are above 21 ° C and humidity is above 70 per cent. Do not apply if temperature exceeds 27 ° C.

Tank Mixes:

Herbicides: When tank mixing observe all instructions and precautions on each product label.

Wheat and Barley: 2,4-D amine may be tank mixed with Banvel, Lontrel, Pardner and Sencor.

2,4-D ester may be tank mixed with Pardner, Avenge, Assert, Lontrel.

Barley: 2,4-D amine and ester may be tank mixed with TCA.

Winter wheat: 2,4-D amine may be tank mixed with Pardner. 2,4-D ester may be tank mixed with Pardner, Avenge.

Fertilizers: None.

Insecticides: None.

Restrictions:

Rainfall: 2,4-D amine - within four hours will reduce control.

2,4-D ester - within two hours will reduce control.

Grazing: Do not graze for 24 hours after treatment.

Recropping: No restrictions the year after treatment.

Aerial Application: Some amine products may be applied by air. Check the label for detailed instructions.

Storage: 2,4-D LV ester may be frozen.
2,4-D amine requires heated storage.

Tank Cleaning:

When finished spraying 2,4-D, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in tank for several hours (preferrably overnight). Scrub inside surfaces of tank but do not enter the spray tank. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Hazard Rating:

Warning Poison

Afolan F/Lorox DF

Formulations:

Afolan F - 480 g/L linuron formulated as a flowable. Container size - 10 L.

Lorox DF - 50 percent linuron formulated as a dry flowable.

Container size - 5.0 kg.

Crops:

Spring wheat (including durum), oats and barley - only when tank mixed with MCPA amine.

Shelterbelts (caragana, green ash, Siberian and American elm, Manitoba maple, poplar, willow, white spruce, colorado spruce, scots pine.)

Weeds:

See the charts in Section I for a list of weeds controlled.

Crop Stage:

Wheat, barley and oats - 2 to 4 leaf stage.

Established shelterbelts (one year old). Apply as an overall spray to dormant stock or as a directed spray if buds have broken.

Weed Stage:

In cereals, apply when annual broadleaf weeds are in the 2 to 4 leaf stage and when green foxtail is in the 1 to 2 leaf stage.

In shelterbelts, apply when weeds are less than 4 inches (10 cm) tall.

Costs:

Cereals (MCPA tank mix) - $6.14 to 7.80/acre (1991 suggested retail price).

Shelterbelts - $47.50 to 95.00/acre (1991 suggested retail price).

Rates:

Crop	Rate			
	Afolan F		Lorox DF	
	(L/acre)	One 10 L container treats:	(L/acre)	One 5 kg container treats:
Cereals (with 0.45 L/acre MCPA amine 500)	0.19 to 0.237	52.6 to 42.2 acres	0.172 to 0.202	29.0 to 24.8 acres
Shelter-belts	1.9 to 3.8	5.3 to 2.6 acres	1.74	2.9 acres

Volume:

Cereals - 10 gallons/acre (45 L/acre).

Shelterbelts - 30 gallons/acre (135 L/acre).

Pressure:

200 - 275 kPa (30 to 40 psi).

Nozzles:

Stainless steel, flat fan nozzles with 50-mesh line strainers and screens.

Effects of Weather:

Best weed control when temperatures are moderate, when relative humidity is high and when soil moisture is adequate. Injury to cereals (crop lightening) will occur when the crop is under stress due to drought or disease. This injury is worse when the product is applied at advanced leaf stages.

Tank Mixes:

Herbicides: Must be tank mixed with MCPA amine for use in spring wheat, oats and barley. Do not tank mix with other herbicides.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within four hours may reduce control.

Grazing: Do not graze or feed green plants to livestock.

Recropping: No restrictions one year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not store Afolan F at temperatures below 5 ° C. Lorox DF may be frozen.

Tank Cleaning:

When finished spraying Afolan F/Lorox DF, run clean water through the tank, pump and lines. Drain and refill with clean water and 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Remove and clean nozzle screens and filters. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:

long-sleeved shirt/long pants

coveralls

chemical-resistant boots and gloves (unlined neoprene or nitrile)

wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:

impermeable apron

goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Ally + 2, 4-D

Formulation:

60 per cent metsulfuron methyl formulated as a dry flowable.

Ally container size - 122 grams.

Crops:

Wheat (spring and durum), barley.

Weeds:

See charts in Section I for a list of weeds controlled.

Caution:

Recropping restrictions for Ally will severely limit cropping opportunities on fields where it has been used. Ally residues affect broadleaf crops in years after treatment. If you are considering using this product, be sure to read the pH and recropping restrictions outlined on the label.

Crop Stage:

2 leaf to flag leaf stage.

Weed Stage:

2 to 4 leaf stage. Wild buckwheat must be sprayed in the cotyledon to 3 leaf stage. For suppression of Canada thistle, apply when thistles are less than 6 inches (15 cm) tall.

Weed Resistance Note:

Populations of kochia have been identified in Manitoba that are resistant to a group of herbicides which include Ally. These populations developed following use of Group 2 herbicides year after year on the same field. Populations of wild mustard have been identified in Manitoba that are resistant to a group of herbicides which includes 2,4-D. These populations developed following use of Group 4 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for further information on minimizing the risk of developing weed resistance on your farm.

Cost:

$ 4.03/acre (1991 suggested retail price).

Rates:

Apply 0.002 kg/acre + 0.2 L/acre 2,4-D ester or amine (500 g/L formulations). Add Agral 90, Agsurf or Citowett Plus at 0.2 L per 100 L spray volume. (One 122 gram container of Ally treats 61 acres.)

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 to 275 kPa (35 to 40 psi).

Nozzles:

Flat fan nozzles. Use 50-mesh screens.

Effects of Weather:

Ally may injure crops stressed by heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/ night temperatures, drought, or water-saturated soils, either before or after application. Weed control will be reduced under dry conditions.

Tank Mixes:

Herbicides: In order to minimize the risk of developing weed resistance, Ally must be applied as a tank mix with 2,4-D.

Fertilizer: None registered.

Insecticide: None registered.

Restrictions:

Rainfall: Within eight hours will reduce weed control.

Grazing: Do not graze treated crops.

Recropping: The persistence of Ally, and its effects on succeeding crops, is unpredictable. The following recropping intervals, based on soil pH, should be considered as guidelines only. Ally residues may affect crops for a longer period of time than outlined in the following Table. Add 12 months to recommendations if less than 10 inches (250 mm) rainfall in any year following application.

MINIMUM RECROPPING INTERVAL (MONTHS)

SOIL PH	BARLEY, OATS, SPRING WHEAT	RAPE-SEED	FLAX	LENTILS
Less than 7.0	10	10	10	34
7.0 - 7.9	10	22	34	48

Effects of Ally residues on crops other than those listed in the Table have not been fully evaluated. Due to the length of recropping restrictions and the lack of information on many rotational crops, Ally is not recommended for use on farms where special crops are grown (peas, fababeans, beans, sunflowers, buckwheat, corn, sugar beets, etc.).

AERIAL APPLICATION: Do not apply by air.

STORAGE: Store in a cool, dry place. May be frozen.

Tank Cleaning:

When finished spraying Ally + 2,4-D, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in tank for several hours (preferrably overnight). Scrub inside surfaces of tank but do not enter the spray tank. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Hazard Rating:

Caution Poison

Assert

Formulation:

300 g/L imazamethabenz formulated as an ester.

Container Size - 10.8 L.

Crops:

Hard red spring wheat, and barley. Although registered for use on durum wheat, growers should be aware that injury to durum wheat, as a result of Assert applications, has been reported in Manitoba.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

1 to 6 leaf stage.

Weed Stage:

Wild oats - 1 to 4 leaf stage, wild mustard and stinkweed - cotyledon to 6 leaf stage, suppression of wild buckwheat and tartary buckwheat - cotyledon to 4 leaf stage.

Cost:

$12.51 - 15.34/acre (1991 suggested retail price).

Rates:

Apply 0.53 L/acre if majority of wild oats are in the 1 to 3 leaf stage. Apply 0.65 L/acre if majority of wild oats are in the 1 to 4 leaf stage or when tank mixing with 2,4-D ester or MCPA ester. One 10.8 L container of Assert treats 16.6 to 20.3 acres.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Do not apply Assert 24 hours before or after a frost. It works best at warm temperatures. Performs relatively consistently under dry conditions. If wet soil conditions persist in the days after application, retillering of wild oats may occur.

Tank Mixes:

Herbicides: Assert at 0.65 L/acre can be tank mixed with up to 0.45 L/acre 2,4-D ester (500 g/L) or with up to 0.45 L/acre MCPA ester (500 g/L). Tank mixes with 2,4-D ester or MCPA ester must be applied after the crop has reached the 4 leaf stage. Allow five days between application of Assert and any other herbicide. When tank mixing, add the broadleaf herbicide to the tank when half-full, then add Assert.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 3 hours will reduce control.

Grazing: Do not graze treated fields or cut treated forage for silage or hay. Matured barley, wheat grain or straw from fields treated with Assert can be fed to livestock.

Recropping: Do not use Assert on farms where potatoes are included in the rotation. Rotate only to spring wheat (including durum), barley, canola or sunflower the year after application in the black and grey wooded soil zones. Residual carryover two years or more after application has not been fully evaluated on other crops. Growing test strips of sensitive crops may give some indication as to whether it is safe to rotate into other crops. However, yield losses within the test strips may not be noticed unless yield can be compared to an untreated area seeded adjacent to the Assert treated strip.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Hazard Rating:

Caution Poison

Assure

Formulation:

96 g/L quizalofop ethyl formulated as an emulsifiable concentrate.

Container size - 8 L.

Crops:

Canola, flax, soybeans, alfalfa (seed production).

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

No leaf stage restrictions, but do not apply within preharvest intervals listed in the table:

CROP	PREHARVEST INTERVAL (days)
Canola	64
Flax	82
Soybeans	80

Weed Stage:

Wild oats - 2 to 4 leaf stage and prior to tillering.

Green foxtail, barnyard grass, volunteer wheat, volunteer barley - 2 leaf stage until beginning of the development of first tiller.

Quackgrass - 2 to 6 leaf stage.

Weed Resistance Note:

Wild oats and green foxtail that are resistant to a group of herbicides which includes Assure, have been identified in Manitoba. These populations of wild oats and green foxtail developed following use of Group 1 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Costs:

$14.50 - 21.84 (suggested retail price).

Rates:

Weeds	Rate	
	L/acre	Acres Treated per 8 L Container
Green foxtail, barnyard grass, wild oats, volunteer wheat, volunteer barley	0.405	20
Quackgrass	0.61	13

Add CanPlus 411 at a rate of 0.05 to 0.1 L per 100 L spray solution. Use the highest rate if wild oats or quackgrass are present in the field.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

210 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan with 50 mesh or coarser nozzle screens.

Effects of Weather

Crop injury may occur if crops are stressed due to drought or flooding. Less than acceptable weed control may be expected if weeds are under stress due to drought, flooding or cool weather.

Tank Mixes:

Herbicides: May be tank mixed with Muster for use in canola.

Fertilizer: None registered.

Insecticides: None registered.

Allow 24 hours after application to apply a broadleaf herbicide. If the broadleaf herbicide is applied first, wait seven days before application of Assure.

Restrictions:

Rainfall: Within one hour of application may reduce control.

Grazing: Do not graze treated fields or harvest as livestock feed in year of treatment.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

Remove nozzles, screens and flush tank, pump, hoses and boom with a minimum of 3 changes of water. Clean nozzles and screens separately.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, do not induce vomiting and get medical help immediately.

Atrazine

Formulations:

Aatrex Liquid - 480 g/L atrazine formulated as a liquid.

Aatrex Nine-0 - 90 per cent atrazine formulated as a dispersible granule.

Atrazine 500 - 500 g/L atrazine formulated as a flowable.

Atrazine 90W - 90 per cent atrazine formulated as a wettable powder.

Container sizes - various.

Crops:

Corn (silage, field).

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Preplant incorporated treatments - will not provide control of green foxtail except in combination with Dual or Eradicane.

Preemergence treatment (after planting but prior to emergence of weeds and crop) - are recommended for use in Manitoba only on fields which are irrigated. Inconsistent weed control will occur if 0.5 inches (1.25 cm) of water/precipitation does not occur within 7 days of application.

Postemergence treatment - 1 to 6 leaf stage.

Weed Stage:

Broadleaf weeds - less than 4 inches (10 cm) tall.

Cost:

$8.53 - 15.65 (1991 suggested retail price).

Rates:

	Rates	
	Aatrex Nine-0 Atrazine 90W	**Atrazine 500 Aatrex Liquid**
Preemergence (irrigated corn only)	0.45 to 0.69 kg/acre	0.85 to 1.25 L/acre
Post emergence	0.45 to 0.69* kg/acre	0.85 to 1.25* L/acre

* Add 1.13 L/acre of oil concentrate or 6.88 L/acre crop oil with post emergence applications of these products.

Weed Resistance Note:

Populations of a number of different weed species which are resistant to a group of herbicides, including atrazine, have developed. These populations developed following the use of Group 5 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (Page 12) for information on minimizing the risk of developing weed resistance.

Water Volume:

15 to 30 gallons/acre (70 to 135 L/acre).

Pressure:

200 - 300 kPa (30 to 45 psi).

Nozzles:

Flat fan with 50-mesh or coarser screens.

Effects of Weather:

Post emergence applications made during periods of cold weather may cause crop lightening. Hot dry weather preceeding post emergence applications may result in reduced weed control.

Tank Mixes:

Herbicides - Aatrex Nine-0 may be tank mixed with Eradicane, Dual, or Bladex when applied at pre emergence.

Fertilizers - For preemergence applications, nitrogen solutions or complete liquid fertilizers may replace all or part of the water as a carrier for some formulations of atrazine.

Do not apply atrazine with nitrogen fertilizer after corn has emerged as crop injury will occur.

Insecticides - None registered.

Restrictions:

Rainfall: Within two hours of post emergence applications may result in reduced weed control.

Grazing: No restrictions.

Recropping: All crops except corn and triazine-tolerant canola may be affected the year following the use of atrazine. Flax, peas and fababeans have some tolerance to atrazine residues and are usually not affected by rates of up to 0.9 L/acre (500 g/L formulations) or 0.5 kg/acre (90 per cent atrazine formulations) applied the previous year. Other more sensitive crops may be affected two or more growing seasons after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze Aatrex Plus and Atra-Mix.

Tank Cleaning:

When finished spraying Atrazine, run clean water through the tank, pump and lines. Drain and refill with 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces (but do not enter tank). Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, give large quantities of water and induce vomiting. Get medical help immediately.

Avadex BW

Formulation:

400 g/L of triallate formulated as an emulsifiable concentrate.

Container sizes - 22.7 L, 115 L, 800 L.

10 per cent triallate formulated as a granular.

Container size - 22.7 kg, 454 kg.

Crops:

spring wheat
barley
flax
rapeseed (including canola)
mustard
field and processing peas
seedling alfalfa
seedling red clover
seedling alsike clover
seedling sweet clover
seedling bird's-foot trefoil

Weeds:

See the charts in Section I for a list of weeds controlled.

Crop Stage:

Pre plant incorporated in fall (after September 15 but prior to freeze-up) - all labelled crops.

Surface-applied in fall (after October 15) with incorporation delayed until spring - all labelled crops.

Preemergence in spring:

before seeding - all labelled crops;

after seeding - barley, spring or durum wheat.

Weed Stage:

Preemergence.

Weed Resistance Note:

Populations of wild oats that are resistant to Avadex BW have been identified in western Canada. These populations developed following use of this herbicide year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$10.10 to 14.60/acre (1991 suggested retail price).

Rates:

Apply according to the Tables on next pages.

Apply recommended rates for the companion crop when using in underseeded alfalfa, trefoil, or clover species.

Water Volume:

10 gallons/acre (45 L/acre) liquid formulation.

Pressure:

200 kPa (30 psi) liquid formulation.

Nozzles:

Flat fan, liquid formulation only.

Avadex BW Liquid Rates – Spring Treatment

Crop	Application Timing	RATE (L/acre)		ACRES/22.7 L CONTAINER	
		Organic Matter		Organic Matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Spring and Durum Wheat	Before Seeding After Seeding	1.21 1.42	1.42 1.72	18.8 16.0	16.0 13.1
Barley	Before and After Seeding	1.42	1.72	16.0	13.1
Rapeseed (including canola), Flax, Mustard, Sugar Beets	Before Seeding	1.72	2.23	13.1	10.2
Peas (dry)	Before Seeding	1.72	1.72	10.2	10.2

Avadex BW Granular Rates – Fall Treatment – Incorporated

Crop	RATE (kg/acre)			ACRES/22.7 kg CONTAINER		
	Organic Matter			Organic Matter		
	Less than 2%	2-4%	Greater than 4%	Less than 2%	2-4%	Greater than 4%
Spring and Durum Wheat	4.45	5.67	6.88	5.1	4.0	3.3
Barley	4.45	5.67	6.88	5.1	4.0	3.3
Rapeseed (including canola), Flax, Mustard, Sugar Beets	5.67	6.88	8.9	4.0	3.3	2.6

Avadex BW Granular Rates – Fall Treatment – Surface Applied

Crop	RATE (kg/acre)			ACRES/22.7 kg CONTAINER		
	Organic Matter			Organic Matter		
	Less than 2%	2-4%	Greater than 4%	Less than 2%	2-4%	Greater than 4%
Spring and Durum Wheat	–	5.67	6.88	–	4.0	3.3
Barley	–	6.88	6.88	–	3.3	3.3
Rapeseed (including canola), Flax, Mustard, Sugar Beets	–	6.88	8.9	–	3.3	2.6

Avadex BW Granular Rates – Spring Treatment

Crop	Application Timing	RATE (kg/acre)		ACRES TREATED PER 22.7 L CONTAINER	
		Organic Matter		Organic Matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Spring and Durum Wheat	Before Seeding After Seeding	4.45 5.67	5.67 6.88	5.1 4.0	4.0 3.3
Barley	Before and After Seeding	5.67	6.88	4.0	3.3
Rapeseed (including canola), Flax, Mustard, Sugar Beets	Before Seeding	6.88	8.9	3.3	2.6

Incorporation:

The liquid formulation must be incorporated into soil that is free of lumps or trash. The granular formulation may be incorporated into trashy soil and is best suited for fall use. For fall incorporated applications of Avadex BW Granular, apply and incorporate between September 15 and freeze-up. For fall surface applications, apply after October 15 and before freeze-up. Incorporate in spring. For spring applications, incorporate after seeding when using the product in wheat and before seeding in all other labelled crops. (Avadex BW may be applied and incorporated after seeding in the case of barley, wild oat control is generally less acceptable than when applied before seeding. In wheat, lower rates must be used before seeding to minimize crop injury and consequently wild oat control will be more consistent if Avadex BW is applied after seeding wheat.)

Incorporate to a depth of 2 inches (5 cm) by setting disc or cultivator implements to cut 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. Ensure that cereals are seeded below the treated layer (2 to 3 inches 5 to 7.5 cm). If the herbicide is applied and incorporated after seeding (as in wheat or barley), avoid ridging the soil by incorporating with harrows. For the liquid formulation, cultivate, disc or harrow the chemical into the soil the same day as application. For fall incorporated treatments, incorporate as soon as possible but within 48 hours of application. A second incorporation should be performed at right angles to the first. For fall applications, the second incorporation may be delayed until the following spring. For fall surface applications, incorporation may be delayed until spring. For spring applications, the second incorporation may be done immediately or delayed for several days but must be completed before crop emergence.

Effects of Weather:

Reduced control may result if prolonged cool conditions or dry soil conditions prevail at the time weeds are emerging. Thinning of wheat can occur under conditions of heavy rainfall or if cold soil conditions persist as the crop emerges.

Tank Mixes:

Herbicides - Avadex BW liquid may be tank mixed with liquid formulations of trifluralin (Rival, Treflan, Triflurex) for control of wild oats, green and yellow foxtail in wheat and barley. Apply after seeding but prior to crop emergence. Consult the recommendations for Rival, Treflan or Triflurex for rates in different soil types.

Fertilizer - Avadex BW liquid alone or tank mixed with liquid formulations of trifluralin may be tank mixed with liquid fertilizer. Compatibility of the herbicide and liquid fertilizer should be checked following the instructions on the herbicide label prior to adding the herbicide to the spray tank.

Avadex BW liquid may be sprayed on dry urea fertilizer. A minimum of 150 kg/ha (60 kg/acre) of dry urea fertilizer must be used. Only commercial blending is recommended.

Insecticides - None registered.

Restrictions:

Rainfall: Rainfall is required for activation of Avadex BW.

Grazing: Do not graze or feed cereals as silage or hay. Do not graze or feed treated forage crops in year of treatment.

Recropping: Do not seed tame oats the year after treatment with Avadex BW.

Aerial Application: Avadex BW Granular may be applied by airplane with attachments designed for applying low volumes of granules.

Storage: Do not freeze liquid formulations.

Store formulations in a cool, dry place.

Tank Cleaning:

When finished spraying Avadex BW, run clean water through the tank, pump and lines. Drain and refill with clean water and 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces (but do not enter tank). Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes and get medical help. If swallowed, get medical help immediately.

Hazard Rating:

Warning Poison

Avenge 200 C

Formulation:

200 g/L difenzoquat formulated as a solution.

Container size - 20 L.

Crops:

Barley
Wheat (Neepawa, Glenlea, Selkirk, Chester, Macoun, Benito, Columbus, Conway, Fielder, Katepwa, Kenyon, Lancer, Leader, Genesis, Oslo and Canuck only)
Winter wheat (Norstar, Sundance only)
Canary seed
Fall rye (Cougar, Puma, Frontier, Rymin, Kodiak only)
Triticale (Welsh and Carman)

Bromegrass
Creeping red fescue
Crested wheatgrass
Kentucky bluegrass
Meadow fescue
Orchard grass
Reed canarygrass
Russian wild rye-grass, Timothy
Alfalfa
Alsike clover
Red clover
Sweet clover
Bird's-foot trefoil

Use on forages only when underseeded to a cereal.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Do not apply after the 6 leaf stage of cereal or grass crops.

Weed Stage:

3 to 5 leaf stage.

Cost:

$12.64 to 15.31/acre (1991 suggested retail price).

Rate:

1.42 to 1.72 L/acre. Use the higher rate if wild oat population exceeds 200 wild oats/square metre (18/square foot). One 20 L container treats 14.1 to 11.6 acres.

Water Volume:

Ground sprayer - 10 gallons/acre (45 L/acre).

Spray coupe - 3.3 to 4.4 gallons/acre (15 to 20 L/acre).

Pressure:

275 kPa (40 psi). Spray coupe - use 300 kPa (45 psi). Direct nozzles on ground equipment to spray at a 45 degree angle in the direction of travel.

Nozzles:

Flat fan directed 45 degrees forward.

Effects of Weather:

Crop injury is worse on hot, humid days than when temperatures are moderate. Best weed control is attained when temperatures are 20 to 30° C, particularly when these temperatures follow application. Do not spray when crop or weeds are wet with heavy dew or rain. Do not apply when crop is under drought stress.

Tank Mixes:

Herbicides - Wheat or barley - Avenge may be tank mixed with MCPA ester, 2,4-D LV ester, Buctril M, Diphenoprop, Estaprop or Refine. Do not apply Avenge in tank mixes with amines of 2,4-D or MCPA.

Canaryseed - Buctril M, MCPA ester.

Insecticides - None registered.

Fertilizers - None registered.

Allow a five-day interval between the application of Avenge and other pesticides.

Restrictions:

Rainfall: Within six hours of application will reduce control.

Grazing: Do not graze or feed treated cereal crop for eight weeks after treatment. Do not graze or feed treated forages in the year of treatment.

Recropping: No restrictions the year after treatment.

Aerial Application: May be applied by air in 2 - 5 gallons/acre (8 - 20 L/acre) water volume.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make a recommendation.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, drink a large quantity of milk or gelatin, then get medical help immediately.

Hazard Rating:

Warning Poison

Banvel

Formulation:

480 g/L dicamba solution.

Container size - 9.5 L, 5.0L, 115L.

Crops:

Barley, oats, spring rye, wheat (durum, spring, winter), canaryseed, field corn, red fescue, pasture, established turf, non-crop areas, chemfallow, parks and golf courses.

Weeds:

See charts in Section I for a list of weeds controlled.

Weed Stage:

Annual broadleaf weeds: 2 to 3 leaf stage.

Winter Annuals: rosettes less than 2 inches (5 cm) across.

Canada thistle, sow-thistle: Apply to Canada thistle and perennial sow thistle in the early bud stage. May be applied to thistle with at least 6 inches (15 cm) of new growth.

Weed Resistance Note:

Populations of wild mustard which are resistant to a group of herbicides including, Banvel and Banvel + 2,4-D or MCPA mixes, have been found in Manitoba. These populations developed following repeated use of Group 4 herbicides on the same field year after year. For information on minimizing the risk of developing weed resistance, see 'Resistance of Weeds to Herbicides' (page 12).

Crop Stage:

CROP	STAGE
Cereals	2 to 5 leaf. Apply at 2 to 3 leaf stage for optimum crop safety.
Canaryseed	3 to 5 leaf
Corn, field	Banvel alone as a broadcast spray: Apply up to 8 inches (20 cm) height on the corn stands. Banvel + 2,4-D as a broadcast spray: Apply up to 4 inches (10 cm) height on the corn stands. When corn is higher, drop nozzles must be used to direct the spray to plant base. Apply no later than two weeks prior to tassle emergence and before the corn is over 20 inches (50 cm).
Red fescue	Apply when crop is 2 inches (5 cm) tall or 3 leaf stage.
Established turf, parks and golf courses	Apply to newly seeded grasses only after second mowing. Do not apply to bent grasses.

Cost:

Cost of Banvel when tank mixed with MCPA/2,4-D in cereals - $2.51 to 3.17/acre (1991 suggested retail price)

Pastures - $22.74 to 50.35

Rates:

CROP	RATE	
	L /ACRE	ACRES PER 9.5 L CONTAINER OF BANVEL (480 g/L)
Barley (tank mixed with 0.344 L/acre MCPA or 2,4-D (500 g/L formulations)	0.093	100
Wheat (tank mixed with 0.344 L/acre MCPA or 2,4-D (500 g/L formulations)	0.093 - 0.117	100 to 80
Canaryseed (tank mixed with 0.344 L/acre MCPA or 2,4-D (500 g/L formulations)	0.117	80
Red fescue	0.243	40
Established turf	0.51	20
Pastures	0.84 - 1.86	11 to 5
Chemical fallow (tank mixed with 0.445 L/acre of 2,4-D, or 0.91 L/acre Sweep or 0.3 to 0.45 L/acre of Roundup)	0.117	80

Water Volume:

Annual crops: 10 gallons/acre (45 L/acre)

Pastures: 10 gallons/acre (45 L/acre)

Pressure:

Less than 150 kPa (20 psi) except corn: 150 to 275 kPa (20 to 40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Crop damage can occur if the chemical is applied at any time other than the recommended stage. Do not apply to crop under stress from adverse environmental conditions such as excess moisture, drought, disease. Apply when air temperature is between 10 - 25 ° C. Do not apply:

- when there is a risk of severe temperature fall in the night;
- under high humidity or fog conditions to prevent drift to sensitive crops;
- when wind is blowing toward a nearby sensitive crop;
- when winds are gusty.

Tank Mixes:

Herbicides: Cereals, red fescue - 2,4-D or MCPA

Canaryseed - MCPA.

Corn, pastures and non crop areas - 2,4-D

Chemfallow - 2,4-D, Sweep, Roundup, Laredo or Wrangler.

Fertilizers: None registered.

Insecticide: None registered.

Restrictions:

Rainfall: No information provided by manufacturer. Allow eight-hour interval between application and rainfall.

Grazing and Harvest: Canaryseed - Use only as bird seed.

Corn - Do not graze cattle or harvest for silage until seven days following treatment of Banvel or Banvel+ 2,4-D amine.

Cereals - Do not graze or harvest for livestock feed prior to crop maturity. If crops are to be used as feed or pasture post maturity, follow pasture grazing restrictions.

Pasture - If treated vegetation has been consumed by meat animals within 30 days of Banvel application, feed the animal with untreated diet for 30 days before slaughter. Meat animals may graze or feed on treated pasture 30 days after Banvel application without restric-

tions on slaughter.

Use the following guidelines for feeding Banvel-treated forage to dairy animals:

RATE/ACRE	DELAY BETWEEN TREATMENT AND HAYMAKING/GRAZING (DAYS)
up to 0.5 L	0
0.501 L to 0.93 L	7
0.931 L to 1.86 L	14
1.87 L to 2.87 L	30

Aerial Application: May be applied by air on cereals only. Use a minimum of 1.8 gallons/acre (8 L/acre).

Storage: May be stored at freezing temperatures.

Tank Cleaning:

When finished spraying Banvel, thoroughly hose down the inside as well as outside surfaces of equipment while filling the spray tank half-full of water. Flush by operating sprayer until the system is purged of the rinse water. Fill tank with water while adding 1 L of household ammonia for every 100 L of water. Operate the spray pump to circulate the ammonia solution through the sprayer solution for 15 - 20 minutes and discharge a small amount of ammonia solution through the spray boom and nozzles. Flush the solution out of the spray tank through the boom. Remove the nozzles and screens and flush the system with two tanks full of water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Basagran

Formulation:

480 g/L bentazon formulated as a solution.

Container size - 7 L.

Crops:

Dry beans (including white, kidney, black and pinto)
Peas
Fababeans
Corn (grain, silage, sweet and seed)
Flax
Soybeans
Turf

Seedling legumes and grasses for seed production only including alfalfa, red clover, alsike clover, sainfoin, bromegrass, creeping red fescue, meadow foxtail, orchardgrass, timothy and crested wheatgrass

Weeds:

See charts in Section I for a list of weeds controlled.

Weed Stage:

Apply when weeds are at the heights recommended in the rate table.

Cost:

$16.64 to 21.32/acre (1991 suggested retail price).

Crop Stage:

Add Assist Oil Concentrate at 0.5 - 1.0 L per 100 L spray mixture. If hot, humid conditions prevail (above 28° C and 80 per cent relative humidity), use only the low rate of Assist Oil Concentrate. Citowett Plus may be used on peas at 0.25 L per 100 L spray mixture.

Rates:

Apply the rate of Basagran listed when weeds in the Table are within the recommended height.

WEEDS	0.71 L/ acre		0.91 L/ acre	
	inches	(cm)	inches	(cm)
ANNUAL WEEDS: Black Nightshade			0.2-0.7	(0.5 - 1.8)
Cocklebur	3 - 7	(7.5 - 17.5)	7 - 12	(17.5 - 30.5)
Common chickweed	Apply 1 to 3 weeks after chickweed emergence.			
Common groundsel			2 - 4	(5.0 - 10.0)
Common ragweed			1 - 2	(2.5 - 5.0)
Corn spurry			1 - 4	(2.5 - 10.0)
Hairy galinsoga			2 - 3	(5.0 - 7.5)
Lady's thumb	1 - 3	(2.5 - 7.5)	3 - 8	(7.5 - 10.0)
Lamb's quarters			0.5 - 1.0	(1.3 - 2.5)
Purslane			1 - 2	(2.5 - 5.0)
Red root pigweed			0.5 - 1.2	(1.3 - 3.2)
Russian thistle			1 - 3	(2.5 - 7.5)
Venice mallow	1 - 2	(2.5 - 5.0)	2 - 4	(5.0 - 10.0)
Wild mustard	1 - 5	(2.5 - 12.5)	5 - 10	(12.5 - 25.0)
PERENNIAL WEEDS:	Repeat application 7 to 10 days after application.			
Canada thistle	6 - 8	(15 - 20)	More than 8	(more than 20)
Yellow nutsedge	6 - 8	(15 - 20)	More than 8	(more than 20)

CROP	STAGE
Soybeans	No restrictions
Dry beans	After the first trifoliate leaf stage
Corn (grain, silage, sweet and seed)	No restrictions
Peas (field and canning)	After 3 pairs of leaves
Fababeans	At least 4 inches (10 cm) tall
Flax	After 2 inches (5 cm) in height
Turf	No restrictions
Seedling forage grasses	1 - 7 leaf stage
Seedling forage legumes	After the 3rd trifoliate leaf stage

Water Volume:

18 to 35 gallons/acre (80 to 160 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan nozzles capable of delivering high water volumes. Direct nozzles 45 degrees forward.

Effects of Weather:

Poor results will occur if temperatures are cool. Apply only if daytime temperatures will exceed 21° C. Do not apply to forage legume seedlings when temperatures exceed 27° C.

Tank Mixes:

Herbicides - None registered.

Fertilizer - None registered.

Insecticides - None registered.

Allow four days between application of Basagran and other herbicides, fertilizers or insecticides.

Restrictions:

Rainfall: Within eight hours will reduce control.

Grazing: Do not graze or harvest as forage in the year of treatment.

Recropping: No restrictions the year after application.

Aerial Application: May be applied by air for weed control in dry beans or soybeans only. Use 5 - 10 gallons/acre (23 - 45 L/acre) water volume. Assist at 0.05 to 0.1 L/acre must be added.

Crop canopy should not cover the weeds.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:

long-sleeved shirt/long pants

coveralls

chemical-resistant boots and gloves

(unlined neoprene or nitrile)

wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:

impermeable apron

goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, drink 2 glasses of water and, if victim is conscious, induce vomiting. Get medical help immediately.

Hazard Rating:

Caution Poison

Bladex L/Bladex Nine-T

Formulations:

Bladex L - 480 g/L cyanazine formulated as a flowable. Container size - 10 L.

Bladex Nine-T - 90 per cent cyanazine formulated as a water dispersible granule. Container size - 10 kg.

Crops:

Corn (field), triazine-tolerant canola (TTC).

Crop Stage:

CROP	TREATMENTS
Corn (preplant incorporated)	Bladex L + Eradicane Bladex L + Dual Bladex Nine-T + Eradicane Bladex Nine-T + Dual
Corn (preemergence)	Bladex L Bladex Nine-T
Corn (postemergence)	Bladex Nine-T + BioVeg
TTC (postemergence - 2 to 4 leaf stage of canola)	Bladex L

Weeds:

See Charts in Section I for a list of weeds controlled.

Weed Stage:

For postemergence applications, apply when green and yellow foxtail is in the 1 to 2 leaf stage; annual broadleaf weeds 2 to 4 leaf stage, except cleavers - 1 to 2 whorls; volunteer flax 1 to 2 inches (2 to 5 cm) tall.

Weed Resistance Note:

Populations of a number of different weed species that are resistant to a group of herbicides, including Bladex have developed. These populations developed following the use of Group 5 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Costs:

Corn (preplant incorporated)
Bladex + Dual - $30.64 - 39.28/acre
Bladex + Eradicane - $31.00 - 49.80/acre
Corn (preemergence) - $20.50 - 21.57/acre
Corn (post-emergence) - $21.11/acre
Triazine-Tolerant Canola -
(post-emergence) - $11.62/acre (1991 suggested retail prices.)

Rates:

CROP	RATE	
	BLADEX L (L/acre)	BLADEX NINE-T (kg/acre)
Corn (preplant incorporated with Dual at 0.81 - 1.11 L/acre)	1.72 - 2.02	0.9 - 1.08
Corn (preplant incorporated with Eradicane at 1.72 - 3.44 L/acre)	1.72 - 2.02	0.9 - 1.08
Corn (preemergence)	1.92 - 2.3	0.9 - 1.08
Corn (postemergence with 1 L BioVeg per 100 L spray solution)	Not recommended	1.1
Triazine-Tolerant Canola (post-emergence)	1.21	Not recommended

Water Volume:

In corn, use 15 gallons/acre (70 L/acre).

In triazine-tolerant canola, use 10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan nozzles with 50-mesh or coarser in-line and nozzle screens. Do not use felt filters.

Effects of Weather:

Application during hot, humid weather may result in a lightening of leaf colour in triazine-tolerant canola. Post-emergence applications on corn will cause crop injury if applied during periods of cold, wet weather, or if these conditions occur within seven days of application.

Tank Mixes:

Herbicides: In corn (preplant incorporated), Bladex L and Bladex Nine-T may be tank mixed with Eradicane 8-E or Dual.

In triazine-tolerant canola, Bladex L may be tank mixed with Poast/Merge or with Lontrel.

Fertilizers: Bladex Nine-T may be tank mixed with liquid fertilizers for preplant incorporated or preemegence application in corn. Conduct a compatibility test by performing a jar-test prior to mixing the products in the tank.

Insecticides: None registered.

Restrictions:

Rainfall: Within two hours may reduce control (postemergence applications).

Grazing: Do not graze or harvest for livestock feed prior to crop maturity.

Recropping: If corn rates are used, plant only corn or triazine tolerant canola, cereals, potatoes, flax, rapeseed (canola), sunflowers, soybeans or peas the year after treatment.

If triazine-tolerant canola rate is used, no recropping restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

When finished spraying Bladex L/Bladex Nine-T, run clean water through the tank, pump and lines. Drain and refill with 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces (but do not enter tank). Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and patient is conscious, induce vomiting. Get medical help immediately.

Hazard Rating:

Danger Poison

Blagal

Formulation:
125 g/L of cyanazine and 250 g/L MCPA formulated as a flowable.

Container size - 10 L.

Crops:
Spring wheat, barley, oats.

Weeds:
See charts in Section I for a list of weeds controlled.

Crop Stage:
2 to 5 leaf stage.

Weed Stage:
2 to 5 leaf stage; hemp nettle 2 to 4 leaf stage. Do not apply to weeds in the cotyledon stage. For Canada thistle suppression, delay until the crop is in 5 leaf stage.

Cost:
$7.01 L/acre (1991 suggested retail price).

Rate:
0.91 L/acre (one 10 L container treats 10.9 acres).

Water Volume:
10 gallons/acre (45 L/acre).

Pressure:
200 - 300 kPa (30 - 45 psi).

Nozzles:
Flat fan nozzles.
Metal screens and filters 50 mesh or coarser.

Effects of Weather:
If crop is under stress from lack of moisture or extremes of temperature, yellowing of lower leaves may result. Application after the 5 leaf stage may cause serious crop injury and give poor weed control.

Tank Mixes:
Herbicides - None registered.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:
Rainfall: Within four hours will reduce control.

Grazing: Do not graze or feed crop for 5 weeks after treatment.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:
The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:
When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:
If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Buctril M

Formulation:

280 g/L bromoxynil and 280 g/L of MCPA ester formulated as an emulsifiable concentrate.

Container size - 8 L.

Crops:

Barley
Oats
Rye
Wheat (spring, durum and winter),
Flax
Corn

Bromegrass
Creeping red fescue
Crested wheatgrass
Intermediate wheatgrass
Meadow fescue
Orchardgrass
Reed canarygrass
Russian wild ryegrass
Slender wheatgrass
Tall wheatgrass
Timothy

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Barley, oats, wheat, fall rye - 2 leaf to shot blade stage;

Winter wheat - 2 to 4 leaf stage in the fall or after growth resumes in the spring but prior to shot blade;

Canaryseed - 3 to 5 leaf stage;

Flax - 2 to 4 inches (5 to 10 cm) tall;

Corn - 4 to 6 leaf stage;

Seedling forage grasses - 2 to 4 leaf stage.

Weed Stage:

2 to 4 leaf stage; kochia and Russian thistle before plants are 2 inches (5 cm) tall.

Cost:

$4.66/acre (1991 suggested retail price).

Rate:

Apply 0.405 L/acre (one 8 L jug treats 20 acres).

Water Volume:

Corn - apply in 20 to 30 gallons/acre (90 to 135 L/acre);
Seedling forage grasses - 15 gallons/acre (70 L/acre);
Other crops - 10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan nozzles.

Effects of Weather:

Best weed control when humidity is high at the time of spraying and for the following day or two. Prolonged cool conditions may result in reduced weed control. Spraying in the evening may reduce the risk of injury to flax. Do not apply to flax, canaryseed or corn if daytime temperatures exceed 27 ° C within 48 hours before or after application.

Tank Mixes:

Herbicides - Flax - Buctril M may be tank mixed with Poast.

Barley and certain wheat varieties - Buctril M may be tank mixed with Avenge.

Wheat, oats, barley - may be tank mixed with 0.28 L/acre MCPAK for improved hemp nettle control or with MCPA amine or ester for volunteer canola control. Use 0.22 L/acre of MCPA (500 g/L).

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Do not graze or feed treated annual crops. Do not graze or feed treated forage grasses in the year of treatment.

Recropping: No recropping restrictions the year after treatment.

Aerial Application: May be applied by air in 2 - 4 gallons/acre (8 to 18 L/acre) water volume. Use the higher volume when the majority of weeds are cow cockle, smartweed, hemp nettle, pigweed or Canada thistle.

Storage: Does not require heated storage.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.

If in eyes, flush with water immediately for 15 minutes.

If swallowed, get medical help immediately. Do not induce vomiting.

Hazard Rating:

Warning Poison

Cobutox 400/Embutox 625

Formulations:

Cobutox - 400 g/L 2,4-DB formulated as an emulsifiable concentrate.

Container size - 10 L.

Embutox 625 - 625 g/L 2,4-DB formulated as an emulsifiable concentrate.

Container size - 8 L.

Crops:

Alfalfa, bird's-foot trefoil, alsike clover and white Dutch clover. May be used on these forage legumes sown alone or with wheat, barley or oats as a cover crop.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Cereals between the 5 leaf and shot blade stage.

Forage legumes must be between the 1 and 3 trifoliate leaf stage.

2 to 4 leaf stage for narrow leaved hawk's beard control, apply in fall after legume growth ceases.

Weed Stage:

2 to 4 leaf stage.

Cost:

$10.61 to 13.60/acre (1991 suggested retail price).

Rates:

PRODUCT	RATE (L/acre)	ACRES TREATED PER CONTAINER
Cobutox 400	1.21 - 1.42	8.3 - 7.0
Embutox 625	0.71 - 0.91	11.3 - 8.8

Use the high rates for fall control of narrow-leaved hawk's beard.

Water Volume:

15 to 20 gallons/acre (70 to 90 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Severe damage to legumes can occur if high temperatures or high humidity prevail at the time of application.

Tank Mixes:

Herbicides: To improve control of wild mustard beyond the 4 leaf stage, Cobutox at the reduced rate of 0.81 L/acre or Embutox 625 at 0.51 L/acre may be tank

mixed with MCPA Sodium Salt (300 g/L) at 0.047 L/acre. This tank mix may increase crop damage. Follow all precautions and restrictions on both product labels.

Fertilizers: None.

Insecticides: None.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Do not graze or feed treated crop in year of treatment.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, do not induce vomiting. Get medical help immediately.

Hazard Rating:

Warning Poison

Copper Sulphate (Alchem/Cominco)

Formulation:

25 per cent elemental copper equivalent. Formulated as cupric sulphate pentahydrate.

Container size: 25 kg.

Use:

Algae control in dugouts.

Application Timing:

Spring, summer or fall.

Rate:

2.6 kg/acre to water which is 3.3 feet deep (or 0.5 lb. per 100,000 gallons of water).

Equipment:

Apply to water surface as a broadcast spray.

Restrictions:

Environmental: This product is toxic to fish. Do n allow discharge from dugouts into other bodies of water. Do not apply to areas frequented by wildlife.

Grazing: No restrictions.

Domestic Use: No restrictions.

Storage: Store in a cool, dry place.

Protective Equipment:

When spraying, wear:
dust mask
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

First Aid:

If this product contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with warm water immediately for 20 minutes. Remove victim to fresh air. If swallowed, and victim is conscious, give two glasses of water and induce vomiting. Get medical help immediately, taking label with you.

Hazard Rating:

Danger Poison

Diphenoprop/Estaprop

Formulation:

300 g/L of dichlorprop and 282 g/L of 2,4-D formulated as an emulsifiable concentrate.

Container Size - Diphenoprop 600 - 10 L; Estaprop - 10 L.

Crops:

Barley, wheat.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Wheat (spring, durum) and barley - 4 leaf to shot blade.

Winter wheat - in spring after tillering but before shot blade stage.

Weed Stage:

2 to 4 leaf stage.

Weed Resistance Note:

Populations of wild mustard which are resistant to a group of herbicides which includes Diphenoprop/Estaprop have been found in Manitoba. These populations developed following repeated use of Group 4 herbicides on the same field, year after year. For information on minimizing the risk of developing weed resistance, see 'Resistance of Weeds to Herbicides' (page 12).

Cost:

$ 5.00/acre (1991 suggested retail price).

Rates:

0.71 L/acre. (One 10 L container of Diphenoprop or Estaprop treats 14 acres.)

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Applications made under dry conditions may result in reduced control. Crops under stress from adverse environmental conditions such as excess moisture, frost or drought may be injured by Diphenoprop or Estaprop. Best weed control when adequate soil moisture is present and warm temperatures prevail.

Tank Mixes:

Herbicides - May be tank mixed with Avenge 200-C for use in barley and wheat. (See Avenge recommendation for varietal restrictions.)

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall - Within eight hours of application will reduce control.

Grazing - Do not graze or cut for feed within 28 days of application.

Recropping - No restrictions the year after application.

Aerial Application - Do not apply by air.

Storage - May be frozen.

Tank Cleaning:

Manufacturers of this product warn that even after thorough cleaning, the use of a sprayer that has come in contact with this product may cause damage to susceptible crops. Use your sprayer only on crops on which Diphenoprop/Estaprop is registered if you have used this product. To clean sprayer, rinse all parts several times with water, then fill sprayer with 1 L of ammonia per 100 L of water and let stand for 24 hours. Rinse several times after with clean water.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush eyes with clean water immediately for 15 minutes. If swallowed, get medical help immediately.

Dual

Formulation:

960 g/L metolachlor formulated as an emulsifiable concentrate.

Container size - 10 L.

Crops:

Corn (grain and silage), soybeans, potatoes.

Weeds:

See charts in Section I for list of weeds controlled.

Crop Stage:

Pre-plant incorporated. In areas with good rainfall or under irrigation, may be applied as a pre-emergence treatment. If Dual is applied after planting but prior to emergence, at least 0.5 inches water (1.25 cm) is required within 10 days of application.

Weed Stage:

Pre-emergence.

Cost:

$ 18.23 - $ 24.98/acre (1991 suggested retail price).

Rates:

0.81 to 1.11 L/acre. (One 10 L container treats 12.3 to 9 acres.) Use higher rates on heavy textured soils or when high populations of weeds are anticipated.

Water Volume:

15 gallons/acre (70 L/acre).

Pressure:

200 to 300 kPa (30 to 40 psi).

Nozzles:

Use flat fan nozzles, 50 mesh screens.

Incorporation:

Apply and incorporate to a firm, even seed bed. To ensure that the product remains in the top 2 inches (5 cm) of soil, follow the incorporation instructions in the Herbicide Incorporation section of this guide.

Effects of Weather:

Extended periods of dry soil conditions may result in reduced weed control. Heavy rainfall following applica-

tion of Dual may dilute the product deeper than 2 inches (5 cm) and result in reduced weed control, particularly on light textured soils.

Tank Mixes:

Herbicides: Dual may be tank mixed with AAtrex Nine-0, AAtrex Liquid, Bladex Liquid, Bladex Nine-T and applied as a pre-plant incorporated treatment or as a pre-emergent treatment with irrigation.

Fertilizers: May be applied with liquid fertilizer. May be impregnated on to dry bulk fertilizers (except nitrate fertilizers or superphosphate fertilizers).

Insecticides: None registered.

Restrictions:

Rainfall: Moderate rainfall shortly after application will enhance activity. Heavy rainfall reduces efficacy by leaching the chemical out of the top few centimetres of soil. Inadequate rainfall after application (within 10 days) will cause reduced weed control.

Grazing: None.

Recropping: In the year of treatment, seed only corn, soybeans, white beans, potatoes, or (10 weeks after application) winter cereals. If Dual has been applied with Bladex or atrazine products, consult the Bladex or atrazine labels for additional recropping restrictions.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

DyVel

Formulation:

84 g/L of dicamba and 336 g/L of MCPAK formulated as a solution.

Container size - 10 L.

Crops:

Wheat, barley, oats, winter wheat.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Wheat, barley, or oats - 2 to 5 leaf stage. Apply at the 2 to 3 leaf stage for optimum crop safety.

Winter wheat - apply in spring when crop is 6 to 10 inches (15 to 25 cm) tall but before shot blade stage.

Weed Stage:

2 to 4 leaf stage and rosettes less than 2 inches (5 cm) in diameter.

Weed Resistance Note:

Populations of wild mustard which are resistant to a group of herbicides which includes DyVel, have been

identified in Manitoba. These populations developed following use of Group 4 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$ 6.03/acre (1991 suggested retail price).

Rate:

0.51 L/acre, (One 10 L jug treats 20 acres.)

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

For best weed control, apply when temperature is between 10 and 25 ° C. Do not treat crops under stress from excessive moisture or drought. To avoid crop injury, do not apply when temperatures exceed 27 ° C, or when there is a risk of severe drop in night time temperature.

Tank Mixes:

Herbicides - None registered.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within eight hours will reduce control.

Grazing: Do not graze or harvest for livestock feed prior to crop maturity.

Recropping: No restrictions the year after treatment.

Aerial Application: May be applied by air. Use a minimum of 1.78 gallons/acre (8 L/acre) water volume.

Storage: Do not freeze.

Tank Cleaning:

When finished spraying DyVel, run clean water through the tank, pump and lines. Drain and refill with clean water and 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Scrub inside surfaces (but do not enter tank). Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.

If in eyes, flush with water immediately for 15 minutes.

If swallowed, get medical help immediately.

Hazard Rating:

Caution Poison

DyVel DS

Formulation:

110 g/L of dicamba, 295 g/L 2,4-D amine and 80 g/L mecoprop.

Container size - 10 L.

Crops:

Wheat (spring and durum), winter wheat, barley, oats, and as a fall stubble treatment.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Wheat (spring and durum) - 3 to 5 leaf stage.

Weed Stage:

2 to 4 leaf stage.

Weed Resistance Note:

Populations of wild mustard which are resistant to a group of herbicides which includes DyVel DS have been identified in Manitoba. These populations of wild mustard are also resistant to a number of other herbicides within Group 4. See 'Resistance of Weeds to Herbicides' (page 12) for further information.

Cost:

$ 6.00/acre (1991 suggested retail price).

Rate:

Wheat (spring and durum), - 0.34 to 0.45 L/acre (one 10 L container treats 22 acres).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 kPa (30 psi).

Nozzles:

Flat fan.

Effects of Weather:

Crops under stress from excess moisture, drought, or disease may suffer a further setback when this herbicide is applied. Do not apply when temperature exceeds 27 °C.

Tank Mixes:

Herbicides - None registered.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within eight hours will reduce control.

Grazing: Do not graze or harvest for livestock feed within seven days of application.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

Manufacturers of this product warn that even after thorough cleaning, the use of a sprayer that has come in contact with this product may cause damage to susceptible crops. Restrict use of your sprayer to crops on which DyVel DS is registered if you have used this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.

If in eyes, flush with water immediately for 15 minutes.

If swallowed, and the victim is conscious, induce vomiting. Get medical help immediately.

Edge

Formulation:

50 per cent ethalfluralin formulated as a dry flowable in 9.1 kg jug; 60 per cent dispersible concentrate in 0.75 kg packets;

5 per cent granular in 22.7 kg bags.

Crops:

Canola, peas, mustard, safflower, sunflowers, alfalfa (seedlings) fababeans, soybeans.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Pre-plant incorporated.

Weed Stage:

Pre-emergence.

Weed Resistance Note:

Populations of green foxtail which are resistant to Edge and trifluralin products have been identified in Manitoba. These populations developed following use of Group 3 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Rates:

PRODUCT	SOIL TYPE			
	Light Textured Soils 2-6% Organic Matter	MEDIUM TO HEAVY TEXTURED SOILS		
		2-4% Organic Matter	4-6% Organic Matter	6-15% Organic Matter
Spring Edge DC	0.57 kg/acre	0.57 kg/acre	0.77 kg/acre	0.93 kg/acre
Spring Edge DF	0.69 kg/acre	0.69 kg/acre	0.89 kg/acre	1.13 kg/acre
Spring Edge Granular	6.9 kg/acre	6.9 kg/acre	8.9 kg/acre	11.3 kg/acre
Fall Edge Granular	Not Recommended*	8.9 kg/acre	11.3 kg/acre	11.3 kg/acre

Cost:

$10.63 to 17.40 per acre (1991 suggested retail price).

* The two fall incorporations required will leave light soils vulnerable to wind or water erosion. This use is not recommended.

Although Edge DF and Edge DC are registered for use in the fall, these uses are not recommended as incorporation requirements may predispose fields to erosion.

Water Volume:

10 gallons/acre (45 L/acre) - (Edge DF and Edge DC only).

Pressure:

200 to 275 kPa (35 to 40 psi).

(Edge DF and Edge DC only).

Equipment and Nozzles:

Apply Edge DF and Edge DC using a ground sprayer. The sprayer must be equipped with a jet, sparge or mechanical agitator. Return line agitation is not sufficient to keep the product in suspension. Use 16 mesh screens in the agitation cycle, 50 mesh screens at the nozzles.

Apply Edge Granular using a calibrated granular applicator.

Mixing:

Edge DF - fill the tank 1/2 full with water and begin agitation. Slowly add half the required amount of Edge DF. Continue filling the tank with water, gradually adding the remaining amount of Edge DF. Continue vigorous agitation at all times. Avoid adding Edge DF over the sump opening as filter plugging may occur.

Edge DC - Fill the tank 1/3 full with clean water and begin agitation. Add all of the required Edge DC packets directly into the spray tank. Continue agitation. Wait 10 minutes, then continue filling the tank with water. Prior to spraying wait five more minutes with agitation running after filling is complete.

Incorporation:

Two incorporations required at right angles for thorough mixing. The first incorporation must be completed within 24 hours of spraying. When using Edge DF or Edge DC, the second incorporation may be done immediately after the first. When using the granular formulation, delay the second incorporation for three days after the first. If applying Edge granular in the fall, both incorporations must be done in the fall to obtain satisfactory results.

Effects of Weather:

Crops stressed by cold weather, excessive moisture or drought may be injured by Edge. Dry soil conditions between application and emergence may result in decreased weed control.

Tank Mixes:

Herbicides - May be tank mixed with Sencor for use on peas.

Fertilizers - Edge DF can be applied with liquid fertilizer. Do a compatability test prior to mixing. Do not mix Edge DC with liquid fertilizer.

Insecticides - None registered.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze or harvest as feed prior to crop maturity.

Recropping: Sugar beets, red beets, oats, canaryseed and small-seeded grasses may be affected the year after treatment. Damage to wheat may occur if the crop is seeded onto land that has been treated with broadleaf weed control rates of trifluralin or Edge for two consecutive crop years. Thinning of crop may occur in areas which have received abnormally low amounts of precipitation. Damage tends to be greater on fields treated with the spring-applied granular treatments.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. Edge DF and Edge Granular may be frozen. Do not freeze Edge DC. Do not expose to prolonged sunlight or heat.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make a recommendation.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.

If in eyes, flush with water immediately for 15 minutes.

If swallowed, contact a physician and if victim is conscious, induce vomiting and administer 0.3 L of water to children, or 0.7 L water to adults.

Eptam 8-E

Formulation:

800 g/L of EPTC formulated as an emulsifiable concentrate.

Container size - 10 L.

The level of weed control will be reduced where Eptam is used on soils which have been treated with Eradicane or Eptam the previous growing season. It is anticipated that the reduction in control will be greater where Eradicane or Eptam has been used repeatedly for two or more years.

Crops:

Dry beans, flax, potatoes, seedling alfalfa, seedling birdsfoot trefoil, sugar beets, sunflowers.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Pre-plant incorporated.

Weed Stage:

Pre-emergence.

Cost:

$15.40 - 30.80 (1991 suggested retail price).

CROP	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Dry and snap beans	1.72 - 2.23	5.8 - 4.5
Seedling alfalfa, seedling bird's-foot trefoil, flax, sunflowers	1.72	5.8
Potatoes	1.72 - 3.44	5.8 - 2.9

Rates:

Where a rate range appears, use the lower rate on light textured soils and the higher rate on heavy textured soils. Do not use on soils with less than 3 per cent organic matter or more than 15 per cent organic matter.

Water Volume:

Minimum of 10 gallons/acre (45 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Equipment and Nozzles:

Since Eptam is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil).

Use the lower rate on light, sandy soils and the higher rate on heavy, textured soils. Do not use on muck or peat soils or on mineral soils with more than 15 per cent organic matter.

Incorporation:

All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application preferably during the spraying operation as Eptam is volatile. Set disc and cultivator implements to cut to a depth of 10 to 15 cm (4 to 6 inches). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device which extends beyond the width of the implement.

Effects of Weather:

Crop injury can occur if stressful environmental conditions (cold, wet soils drought or excessive heat) prevail after seeding. To minimize crop injury, delay seeding 10 days if these conditions prevail at the time of application, or select an alternative product. Very cold or dry soil conditions during weed emergence will reduce control.

Tank Mixes:

Herbicides - Eptam may be mixed with Lexone DF, Sencor DF for use on potatoes. Apply 1.72 to 2.23 L/acre of Eptam 8-E tank mixed with 0.142 to 0.223 kg/acre of Lexone DF (75%) or 0.222 to 0.343 L/acre Sencor 500 F (500 g/L) or 0.151 to 0.222 kg/acre Sencor 75 DF (75%). Do not use on red skinned potatoes or early varieties or on varieties Belleisle, Tobique or Shepody or on soils with greater than 7% organic matter or less than 2%

organic matter. See Lexone/Sencor cropping restrictions.

Fertilizers - May be mixed with liquid fertilizer. Compatability test should be conducted according to instructions on the herbicide label. Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with Eptam 8-E. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1.5 cm depth. The first incorporation must be done immediately after application.

Insecticides - Do not tank mix with fungicides or insecticides.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze or feed treated crops to livestock.

Recropping: Will not injure crops the year after spring application.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough label information on tank cleaning to make a recommendation. Contact the manufacturer for tank cleaning instructions.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:

impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately. Do not induce vomiting. If victim is conscious, administer several glasses of water.

Hazard Rating:

Eradicane 8-E

Caution Poison

Formulation:

800 g/L of EPTC (plus safener) formulated as an emulsifiable concentrate.

Container size - 10 L.

Caution:

The level of weed control will be reduced where Eradicane is used on soils which have been treated with Eradicane or Eptam the previous growing season. It is anticipated that the reduction in control will be greater where Eradicane or Eptam has been used repeatedly for two or more years.

Crops:

Corn.

Weeds:

See charts in Section I for a list of weeds controlled.

USE	RATE (L/acre)	ACRES TREATED PER 10 L CONTAINER
Annual weed control in light textured soils	1.72	5.8
Annual weed control in heavy textured soils	2.23	4.5
Quackgrass suppression	3.44	2.9

Rates:
Crop Stage:
Pre-plant incorporated.

Weed Stage:
Pre-emergence.

Cost:
$18.00 - 36.00/acre (1991 suggested retail price).

Water Volume:
Minimum of 10 gallons/acre (45 L/acre).

Pressure:
200 to 275 kPa (30 to 40 psi).

Equipment and Nozzles:
Since Eradicane 8-E is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil).

Incorporation:
All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application, preferably during the spraying operation as Eptam is volatile. Set disc and cultivator implements to cut to a depth of 10 to 15 cm (4 to 6 in.). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow, or other levelling device, which extends beyond the width of the implement.

Effects of Weather:
Poor weed control may result if soils are wet during incorporation.

Tank Mixes:
Herbicides - Eradicane 8-E may be mixed with Bladex or with Atrazine.

Fertilizers - Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with Eradicane 8-E. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnated. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1.5 cm depth. The first incorporation must be done immediately after application.

Insecticides - Do not tank mix with fungicides or insecticides.

Restrictions:
Rainfall: No effect once incorporated.

Grazing: Do not graze or feed treated crops to livestock.

Recropping: Will not injure crops the year after spring application.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:
The manufacturer does not provide enough label information on tank cleaning to make a recommendation. Contact the manufacturer for tank cleaning instructions.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:
When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:
If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately. Do not induce vomiting. If victim is conscious administer several glasses of water.

Hazard Rating:
Caution Poison.

Excel Super

Formulation:

80.5 grams/L of fenoxaprop-p-ethyl formulated as a solution.

Container size 9 L.

Crops:

Flax, lentils, mustard, rapeseed (including canola), triazine-tolerant canola (TTC), peas, sunflowers and potatoes. Although registered for use on buckwheat, this use is not recommended due to the lengthy pre-harvest interval.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Broadleaf crops are tolerant at all growth stages. Follow the pre-harvest intervals in the table to avoid unacceptable levels of fenoxaprop in the harvested crop.

CROP	APPLICATION INTERVAL TO HARVEST (days)
Potatoes	35 days
Flax, mustard	60 days
Rapeseed (including canola and TTC)	70 days
Peas (field and processing)	75 days
Lentils	82 days
Sunflowers	100 days

Weed Stage:

Annual grasses 1 to 4 leaf stage or 1 to 6 total leaves including tillers on the main stem. Volunteer corn 2 to 10 inches (5 to 25 cm).

Weed Resistance Note:

Populations of wild oats and green foxtail, which are resistant to a group of herbicides which includes Excel Super, have been identified in Manitoba. These populations developed following use of Group 1 herbicides year after year on the same field. See, 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$14.56 to 16.00/acre (1991 suggested retail price).

Rates:

Rapeseed and canola (including TTC), peas (field and processing), and tame mustard - 0.45 L/acre (one 9 L jug treats 20 acres).

Flax, lentils, potatoes, sunflowers - 0.5 L/acre (one 9 L jug treats 18 acres).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Use stainless steel 80 or 110 degree flat fan. Direct nozzles 45 degrees forward for better spray coverage.

Effects of Weather:

Control is most effective when weeds are growing actively. Apply when temperatures are between 12° C and 28 ° C. Reduced control will occur when conditions are very dry, particularly if weeds have tillered.

Tank Mixes:

Herbicides - Rapeseed (including canola) - Excel Super may be tank mixed with Lontrel. Use 0.91 L/acre Excel with 0.3 L/acre of Lontrel.

- Triazine tolerant canola - Excel Super may be tank mixed with Bladex liquid. Use 0.91 L/acre Excel Super with 1.21 L/acre Bladex liquid. Do not use this tank mix when weeds are under stress as reduced weed control may result.

Allow a 4-day interval before or after application of Excel when using other herbicides.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within three hours may reduce control.

Grazing: Do not graze treated fields prior to harvest. Do not harvest treated crops for feed.

Recropping: No restrictions on crops grown the year after the application of Excel Super.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

When finished spraying Excel Super, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in tank for several hours (preferrably overnight). Scrub inside surfaces of tank but do not enter the spray tank. Flush sprayer with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately. Do not induce vomiting.

Fortress

Formulation:

10 per cent triallate and 4 per cent trifluralin formulated as a granular.

Container size: 22.7 kg bag, 454 kg.

Crops:

Wheat (spring and durum), barley, rapeseed, canola, flax, mustard.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Apply pre-plant incorporated in fall after September 15 until soil freeze-up, or in the spring prior to seeding crop.

Weed Stage:

Pre-emergence.

Weed Resistance Note:

Populations of green foxtail which are resistant to a group of herbicides which includes Fortress, have developed in Manitoba. Populations of wild oats which are resistant to Fortress have been identified in other areas of western Canada. These populations developed following use of Fortress or Avadex year after year on the same field. See `Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$12.80 - 16.00/acre (1991 suggested retail price).

Incorporation and Seeding:

Apply and incorporate in the fall between September 15 and freeze-up or apply in the spring prior to seeding the crop. Two incorporations are required at right angles to one another to ensure even distribution of the product. In fall, the first incorporation must be completed within 24 hours of application. The second may be done either during the fall or the following spring. If performing the second incorporation in the fall, allow at least three days

delay between the first and second incorporation. If the second incorporation is delayed until spring, it may be performed either before or after seeding. If performed after seeding, it must be completed with harrows prior to emergence of the crop.

For spring application, the first incorporation must be completed within 24 hours and prior to seeding of the crop. The second incorporation must be delayed at least 48 hours after the first and may be performed any time until crop emergence. If the second incorporation is conducted after seeding it should be done with a harrow or other suitable tillage equipment adjusted so as not to disturb the seed. If ridging is a problem after seeding, one harrowing is recommended to eliminate the ridging and ensure uniform distribution of the herbicide.

Incorporate no deeper than 2 inches (5 cm) to prevent crop injury and reduction of weed control. To do this, set tillage implements (cultivator or discer) to cut 3 inches (7.5 cm) into the soil. Ensure that cereals are seeded below the treated layer 2 to 3 inches; (5 to 7.5 cm). If the herbicide is applied and incorporated after seeding (as in wheat or barley), avoid ridging the soil by incorporating with harrows.

Harrowing will not provide adequate incorporation if the teeth do not penetrate the soil due to compaction or excessive surface trash.

Effects of Weather:

Crop injury can occur on fields where Fortress has been applied and heavy rainfall or cold weather occur after seeding but prior to crop emergence. Seeding under warm soil conditions (greater than 10 ° C - generally after May 15) will ensure optimum crop germination and emergence and will reduce the risk of crop injury. Very dry conditions in spring or prolonged cool soil temperatures at time of wild oat germination will result in reduced control.

Poor results may be expected from incomplete incorporation due to wet, cloddy soil or heavy trash. Ridges left at seeding may disrupt the treated layer and allow weed escapes. Trifluralin-resistant green foxtail will not be controlled.

Restrictions:

Rainfall: Moisture is required for activation. Rainfall of at least 0.6 inches (1.5 cm) within two weeks of seeding is required to ensure optimum results.

Grazing: Do not graze or harvest treated crop for livestock feed.

Recropping: Fortress will leave a residue in the soil. Oats, sugar beets and small seeded forage grasses may be injured if planted within 24 months of application.

Aerial Application: May be applied by airplane with attachments designed for applying low volumes of granules.

Storage: Store in a cool, dry place.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and the victim is conscious, induce vomiting, then give 0.3 L of water to children, 0.75 L of water to adults. Get medical help immediately.

Rates:

Apply Fortress according to soil organic matter content.

Organic Matter	Rapeseed (canola), flax, mustard		Barley		Spring wheat and durum wheat	
	Spring	Fall	Spring	Fall	Spring	Fall
< 2%	5.67	5.67	N.R.*	4.45	N.R.*	N.R.*
2 - 4%	5.67	5.67	4.45	5.67	N.R.*	4.45
4 - 6%	6.88	5.67	5.67	5.67	4.45	5.67
> 6%	6.88	6.88	6.88	6.88	5.67	5.67

*N.R. - Not recommended.

Fusilade/Fusilade II

Formulation:

125 g/L or 250 g/L of fluazifop. Formulated as an emusifiable concentrate. Container size - 8 L.

Crops:

Rapeseed (canola), flax, soybeans, sugarbeets, sunflowers, alfalfa, red clover and bird's-foot trefoil (seed production only), onions, potatoes, tomatoes, strawberries, ornamentals.

CROP	MAXIMUM RATE (L /acre)	APPLICATION INTERVAL TO HARVEST (days)
Flax	0.81	80
Rapeseed (canola and T.T.C.)	0.81	80
Soybeans	0.81	90
Sugar Beets	0.81	90
Sunflowers	0.81	120
Alfalfa, Red Clover and Birdsfoot Trefoil	0.81	
Onions	0.405	42
Potatoes	0.81	90
Tomatoes	0.81	60
Strawberries	0.81	30
Plants, Shrubs, Trees and Forests and Ornamental Nurseries (consult label for complete list)	0.81	None

Rates:

WEED	RATE (L/acre)	ACRES TREATED PER 8 L CONTAINER
Volunteer corn	0.243	33
Persian darnel, barnyard grass, volunteer spring wheat and spring barley	0.324	25
Wild oats, wild proso millet.	0.405	20
Green and yellow foxtail (wild millet)	0.57	14
Quackgrass	0.81	9.9

Weeds:
See charts in Section I for a list of weeds controlled.

Crop Stage:
Broadleaf crops tolerant at all growth stages. However, the preharvest intervals outlined in the accompanying table must be followed to avoid unacceptable residues of fluazifop in harvested crops.

Weed Stage:
2 to 4 leaf stage of annual grasses and prior to tillering, except for 2 to 5 leaf stage for volunteer corn and 3 to 5 leaf stage of quackgrass.

Weed Resistance Note:
Population of both wild oats and green foxtail, which are resistant to a group of herbicides which includes Fusilade, have been identified in Manitoba. These populations of wild oats and green foxtail are also resistant to a number of other herbicides within Group 1. See 'Resistance of Weeds to Herbicides' (page 12) for further information.

Cost:
$9.06 to 30.20/acre (1991 suggested retail price).

Additives:
If using Fusilade (250 g/L) add 0.1 L of Agral 90 per 100 L spray solution. Do not add the Agral 90 if using Fusilade II (125 g/L).

Water:
10 to 30 gallons/acre (45 to 120 L/acre) water. Use higher water volumes for dense stands of crops/weeds.

Pressure:
200 to 300 kPa (30 to 45 psi).

Nozzles:
Standard flat fan nozzles.

Effects of Weather:
Reduced control will occur if grasses are under stress due to flooding, drought or excessively cool weather, particularly if grasses have tillered.

Tank Mixes:
Herbicides: Flax - Fusilade/Fusilade II may be tank mixed with Poast.

Rapeseed (including canola and triazine-tolerant canola) - Fusilade may be tank mixed with Lontrel. Fusilade/Fusilade II may be tank mixed with Poast.

Triazine-tolerant canola - Fusilade may be tank mixed with Lontrel for Canada thistle control or with Bladex for control of broadleaf weeds. Fusilade (250 g/L) may be tank mixed with Poast.

Soybeans - Fusilade/Fusilade II may be tank mixed with Poast.

Allow four days between applications of Fusilade and other herbicides.

Fertilizers: none recommended.

Insecticides: none recommended.

Restrictions:
Rainfall: Within two hours will reduce weed control.

Grazing: Do not graze or harvest as forage.

Recropping: Do not sow cereals, corn or forage grasses within 60 days of application.

Storage: May be frozen.

Tank Cleaning:
The manufacturer does not provide enough information on tank cleaning to make a recommendation.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Safety Precautions:
Experimental studies have shown that the active ingredient in this product may cause birth defects in laboratory animals. Women capable of bearing children should avoid contact with this product.

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:
If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Gramoxone

Formulation:

200 g/L paraquat.

Container size - 5 L.

Crops:

Stale seedbed - Non-selective weed control applied prior to crop emergence; in beans, corn, potatoes, peas, soybeans.

Non-selective weed control applied as a directed spray between rows in row crop.

Control of weed seedlings in established alfalfa for hay applied after first cut.

Control of weed seedlings in birdsfoot trefoil for seed.

Weeds:

See the charts in section I for a list of weeds controlled.

Crop Stage:

Stale seedbed - apply three days prior to crop emergence.

Alfalfa for hay - apply immediately after first cut.

Bird's-foot trefoil for seed - apply in spring when bird's-foot trefoil shoots are 3 to 6 inches long.

Weed Stage:

Best control when weeds are less than 2 inches (5 cm) in height or diameter.

Cost:

$19.89 to $40.68/acre (1991 suggested retail price).

Rates:

If weeds are less than 2 inches (5 cm) in height, apply 1.1 L/acre (one 5 L jug treats 4.5 acres). If weeds are taller than 2 inches (5 cm), increase the rate of Gramoxone to 2.2 L/acre (one 5 L jug treats 2.2 acres).

Water Volumes:

Use 25 to 100 gallons/acre (120 to 450 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Best results on cloudy days, or just prior to darkness.

Tank Mixes:

Herbicides - None registered.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within one hour will reduce weed control.

Grazing: Do not graze or harvest treated foliage.

Recropping: None.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

When finished spraying Gramoxone, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and Agral 90 at 0.6 L per 1000 L spray solution. Scrub inside surfaces of tank but do not enter tank. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

Gramoxone is fatal if swallowed.

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, induce vomiting immediately if not already occurring. Get to nearest hospital immediately. If delay is unavoidable, administer fluids and induce further vomiting.

Hazard Rating:

Danger Poison

Hoe-Grass 284

Formulation:

284 g/L formulated as an emulsifiable concentrate.

Container size - 20 L.

Crops:

Wheat (spring, durum and winter)
Triticale
Flax
Rapeseed (Canola)
Sugar beets
Fababeans
Peas (field and processing)
Carrots
Soybeans
Tame buckwheat
Seedling forage grasses (intermediate wheatgrass, Russian wild ryegrass, creeping red fescue, crested wheatgrass and bromegrass)
Spring and fall rye
Barley (except Norbert, Glenn, Betzes or Klages)
Mustard
Dry beans (white, black and pinto)
Potatoes
Sunflowers (except Corona) Lentils
Seedling forage legumes (alfalfa, sainfoin, red and sweet clover

Weeds:

See chart in Section I for a list of weeds controlled.

Crop Stage:

Barley - 1 to 4 leaf stage of the crop and prior to tillering.

Other crops - no leaf stage restrictions but do not apply within 60 days of harvest.

Weed Stage:

Wild oats, green and yellow foxtail, barnyard grass - 1 to 4 leaf stage. Although registered for application up to the 5 leaf stage of wild oats, results at this stage are inconsistent and this use is not recommended.

Persian darnel - 1 to 3 leaf stage.

Volunteer corn - 6 to 10 inches (15 to 25 cm) in height.

Weed Resistance Note:

Populations of wild oats and green foxtail, which are resistant to a group of herbicides which includes HoeGrass 284, have been identified in Manitoba. These populations developed following use of Group 1 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$12.85 - 18.24/acre (1991 suggested retail price).

Rates:

CROP	RATE (L/acre)	ACRES TREATED PER 20 L CONTAINER
Dry beans (white, black, pinto), fababeans, potatoes, soybeans and sugar beets	1.42	14
Other labelled crops	1.01 - 1.13	20 - 17.5

Water Volume:

Ground equipment - 10 gallons/acre (45 L/acre).

Aerial equipment - A minimum of 3 gallons/acre (14 L/acre).

Pressure:

Ground equipment - 275 kPa (40 psi).

Nozzles:

Ground equipment - 80 or 110 degree stainless steel flat fan nozzles tilted forward at an angle of 45 degrees.

Tank Mixes:

Herbicides - see table.

Effects of Weather:

Application under hot (above 27 ° C) or droughty conditions will result in reduced weed control. Hoegrass provides optimum results under cool, moist conditions and should be applied when the majority of grassy weeds are in the 2 to 3 leaf stage for best results.

Under certain environmental conditions, yellow biotches may appear on barley leaves. Under certain environmental conditions, especially hot, humid weather, leaf scorch on cereals and leaf cupping and burn on broadleaved crops may result from Hoe-Grass application.

CROP	HOE-GRASS 284 RATE	HERBICIDE TANK MIX
Wheat (spring and durum) Barley (except Norbert, Glenn, Betzes or Klages)	1.13 L/acre	Pardner - 0.405 L/acre. Will not control wild mustard beyond the 3 leaf stage.
Wheat (spring, durum and winter), Barley (except Norbert, Glenn, Betzes or Klages)	1.01 - 1.13 L/acre	Refine - 0.008 kg/acre. Do not add surfactant. This mix will control only wild oats and will not control other annual grassy weeds.
Rapeseed (canola) including Triazine tolerant varieties	1.13 L/acre	Lontrel - 0.3 L/acre.

Fertilizers - none registered.

Insecticides - May be tank mixed with Decis 5.0 E.C. on wheat (spring, winter and durum), Barley (except Norbert, Glenn, Betzes or Klages), flax, rapeseed (canola), mustard and potatoes. See Decis 5.0 E.C. label for recommended rates and cautions.

Do not tank mix Hoe-Grass 284 with any pesticide for aerial application. Do not tank mix Hoe-Grass 284 under stress conditions such as prolonged periods of drought, excessively hot temperatures or low humidity or reduced control of grassy weeds may result. Apply other pesticides, fertilizers or chemical additives at least four days after application of Hoe-Grass 284.

Restrictions:

Rainfall: Within one hour of application will reduce control.

Grazing: Do not graze treated cereal prior to crop maturity. Do not graze treated forages in the year of treatment. Do not graze sainfoin or alsike clover for the life of the stand.

Recropping: No restrictions the year after application.

Aerial Application: May be applied by aircraft for weed control in wheat, barley, flax or rapeseed (canola) only. Apply in a minimum 3 gallons/acre (15 L/acre) water volume. Do not tank mix with any other products.

Storage: Do not freeze. Shake well before using.

Tank Cleaning:

When finished spraying HoeGrass 284, run clean water through the tank, pump and lines. Drain and refill with clean water and 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately. Do not induce vomiting.

Hazard Rating:

Danger Corrosive.

Hoe-Grass II

Formulation:

230 g/L diclofop methyl and 80 g/L bromoxynil formulated as an emulsifiable concentrate.

Container size - 20 L.

Crops:

Wheat (spring and durum), barley (except Norbert, Glenn, Betzes or Klages), spring rye, triticale and flax.

Weeds:

See chart in Section I for list of weeds controlled.

Crop Stage:

Wheat, triticale and spring rye - no leaf stage restrictions but do not apply within 60 days of harvest.

Barley - 1 to 4 leaf stage and before tillering.

Flax - 2 to 4 inches (5 to 10 cm) in height.

Weed Stage:

ANNUAL WEEDS	TIME OF APPLICATION
Wild oats, green and yellow foxtail, barnyard grass	1 to 4 leaf
Persian darnel	1 to 3 leaf
Volunteer corn	6 to 10 inches (15 to 25 cm) in height
Russian thistle	Seedling to 2 inches (5 cm) in height
Other labelled broadleaf weeds	2 to 4 leaf stage

Weed Resistance Note:

Populations of wild oats and green foxtail, which are resistant to a group of herbicides which includes HoeGrass II, have been identified in Manitoba. These populations developed following use of Group 1 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$ 17.71/acre (1991 suggested retail price).

Rates:

1.42 L/acre (one container treats 14.1 acres).

Water Volume:

10 gallon/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80 or 110 degree stainless steel flat fan nozzles tilted forward at an angle of 45 degrees.

Effects of Weather:

Applications of Hoe-Grass II during periods of crop stress due to hot temperature, (above 27° C), when plants are not actively growing, under very dry conditions or low humidity, may result in substantially reduced weed control. Under certain environmental conditions yellow blotches may appear on crop leaves. During periods of stress (above 27 ° C), or high humidity, flax may show leaf burn, retarded growth and a slight delay in maturity. Avoid spraying flax under these conditions.

Best results are obtained from early applications (2 to 3 leaf stage of grassy and broadleaf weeds). Moderate day-time temperature (18 to 24° C) and good moisture conditions provide optimum results.

Tank Mixes:

Herbicides: Hoe-Grass II may be tank mixed with MCPA amine (500 g/L) at the reduced rate of 0.028 L/acre to improve wild mustard control in wheat (spring and durum), barley (except Norbert, Glenn, Betzes or Klages), spring rye and triticale.

Exceeding the recommended rate of MCPA amine 500 will result in a severe reduction in grassy weed control. Application of the HoeGrass II plus MCPA amine mixture should be avoided under hot, dry conditions as severe reductions in grassy weed control will result. Strong crop competition is required for satisfactory weed control with this tank mix. Allow at least four days after application of Hoe-Grass II before applying any other herbicide.

Fertilizers: None registered.

Insecticides: May be tank mixed with Decis 5.0 E.C. on wheat (spring and durum), barley (except Norbert, Glenn, Betzes, or Klages) and flax.

Allow a four-day interval between application of HoeGrass II and other herbicides.

Restrictions:

Rainfall: With one hour will reduce control.

Grazing: Do not graze or harvest for forage prior to crop maturity.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze. Shake well before using.

Tank Cleaning:

When finished spraying HoeGrass II, run clean water through the tank, pump and lines. Drain and refill with clean water and 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately. Do not induce vomiting.

Hazard Rating:

Warning Poison.

Kerb 50-W

Formulation:

50 per cent propyzamide formulated as a wettable powder. Container size - 2.0 kg.

Crops:

Alfalfa (established), bird'sfoot trefoil (established), pastures (established).

Weeds:

See charts in Section I for a list of weeds controlled.

Caution:

Do not use on soils with more than six per cent organic matter.

Crop Stage:

Apply between October 1 and freeze-up.

Weed Stage:

Preemergence.

Cost:

$25.00 - 30.00/acre (1991 suggested retail price).

Rates:

0.36 to 0.45 kg/acre. (one 2 kg bag treats 4.4 to 5.5 acres).

Water Volume:

20 to 45 gallons/acre (90 to 200 L/acre).

Pressure:

200 - 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Dry soil conditions at time of weed emergence may result in reduced control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Rainfall after application beneficial for activation.

Grazing: Do not graze or harvest for livestock feed within 60 days of application.

Recropping: Do not replant to crops within one year of treatment.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, induce vomiting if victim is conscious. Get medical help immediately.

Kil-Mor

Formulation:

295 g/L 2,4-D, 80 g/L mecoprop and 100 g/L dicamba.
Container size - 10 L.

Crops:

Spring wheat (including durum), winter wheat, oats, barley, field corn, fall stubble and summerfallow.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Spring wheat (including durum), oats, barley - 2 to 3 leaf stage.

Winter wheat - spray before crop is 12 inches (30 cm) high in spring.

Corn - overall spray prior to 6 inches (15 cm) in height (leaf outstretched). Use drop nozzles after 6 inches (15 cm) in height.

Weed Stage:

Apply when weeds are in the 2 to 4 leaf stage. For cleavers, apply when the weed is in the 1 to 2 whorl stage.

Weed Resistance Note:

Populations of wild mustard, which is resistant to a group of herbicides including Kil-Mor, have been identified in Manitoba. These populations developed following use of Group 4 herbicides year after year on the same field. See `Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$5.61 - 7.25/acre. (1991 suggested retail price).

Rates:

CROP	RATE (L/acre)	ACRES TREATED PER 10 L CONTAINER
Spring wheat, Winter wheat, oats, corn	0.34 - 0.445	29 - 22.5
Barley	0.34	29
Fall stubble, summerfallow	0.445 - 0.71	22.5 - 14

Water Volume:
10 gallons/acre (45 L/acre).

Pressure:
275 kPa (40 psi).

Nozzles:
Flat fan.

Effects of Weather:
Do not apply Kil-Mor when temperature exceeds 27 ° C. If cold, wet weather prevails at the time of application, corn may become brittle after application of Kil-Mor.

Tank Mixes:
Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:
Rainfall: Within six hours will reduce control.

Grazing: Do not graze or harvest for livestock feed within seven days of application.

Recropping: No restrictions the year following treatment.

Aerial Application: Do not apply by air.

Storage: Heated storage required.

Tank Cleaning:
The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:
When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:
If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and the victim is conscious, induce vomiting. Get medical help immediately.

Hazard Rating:
Caution Poison.

Laddok

Formulation:
200 g/L bentazon and 200 g/L atrazine formulated as a solution.

Container size - 10 L.

Crops:
Corn (grain and silage).

Weeds:
See chart in Section I for a list of weeds controlled.

Rates:

WEEDS	1.21 L/ACRE inches	(cm)	1.62 L/ACRE inches	(cm)
ANNUAL WEEDS Black nightshade			0.2 - 0.8	(0.5 - 2.0)
Cocklebur	3 - 7	(7.5 - 17.5)	7 - 12	(17.5 - 30.0)
Common chickweed	Apply 1 to 3 weeks after emergence			
Common groundsel			2 - 4	(5.0 - 10.0)
Common ragweed	1 - 1.5	(2.5 - 4.0)	1.5 - 3	(4.0 - 7.5)
Corn Spurry			1 - 4	(2.5 - 10.0)
Hairy galinsoga			2 - 3	(5.0 - 7.5)
Lady's thumb	1 - 3	(2.5 - 7.5)	3 - 8	(7.5 - 20.0)
Lamb's quarters	1 - 3	(2.5 - 7.5)	2 - 4	(5.0 - 10.0)
Purslane			1 - 2	(2.5 - 5.0)
Red root pigwed	0.7 - 1.2	(1.5 - 3.0)	1.2 - 1.5	(3.0 - 4.0)
Russian thistle			1 - 3	(2.5 - 7.5)
Venice Mallow	1 - 2	(2.5 - 5.0)	2 - 4	(5.0 - 10.0)
Wild mustard	1-5	(2.5 - 12.5)	5 - 10	(12.5 - 25.0)
PERENNIAL WEEDS Yellow nutsedge	4 - 6	(10.0 - 15.0)	(repeat 7 - 10 days if necessary)	

Crop Stage:

1 to 5 leaf stage.

Weed Stage:

Apply when weeds are at the height recommended in the 'rates' table.

Cost:

$13.92 - 18.63/acre (1991 suggested retail price).

Water Volume:

20 to 40 gallons/acre (90 to 180 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan nozzles capable of delivering high water volumes.

Effects of Weather:

Crop injury may occur if applications are made when crop is under stress due to prolonged cold weather, or when corn is wet and succulent from recent rainfall.

Best weed control is under warm, humid conditions.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within eight hours of application will reduce control.

Grazing: No restrictions.

Recropping: No restrictions the year following treatment when label rates for annual weeds have been used. Use of the double application for yellow nutsedge con-

trol may cause injury to rotational crops due to carry-over of the atrazine component of the product.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and the victim is conscious, give two glasses of water and induce vomiting. Consult a physician immediately.

Hazard Rating:

Caution Poison

Laser

Formulation:

12.5 g/L fenoxaprop-p-ethyl, 112.0 g/L bromoxynil and 112.0 g/L MCPA (low volatile ester). Container size - 20 L.

Crops:

Spring wheat (except durum).

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

2 leaf stage through tillering.

Weed Stage:

1 to 6 leaf stage of green and yellow foxtail (total number of leaves including tillers).

Cotyledon to 4 leaf stage of annual smartweed, cocklebur, red root pigweed, flixweed, bluebur, shepherd's purse, volunteer sunflower, volunteer rapeseed, night flowering catchfly, cow cockle.

Cotyledon to 8 leaf stage of wild and tartary buckwheat, stinkweed, wild mustard, ball mustard, lamb's quarters, common groundsel.

Weed Resistance Note:

Populations of green foxtail, which are resistant to a group of herbicides which includes Laser, has been identified in Manitoba. These populations developed following use of Group 1 herbicides year after year on the same field. See, `Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$10.70/acre (1991 suggested retail price).

Rate:

1.01 L/acre (one 20 L container treats 20 acres).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80 degree or 110 degree stainless steel flat fan nozzles tilted forward at an angle of 45 degrees.

Effects of Weather:

Poor results if temperatures before or after application are above 28° C or when conditions are dry. Crop yellowing may occur under hot (above 28° C) conditions or when humidity is high.

Tank Mixes:

Herbicides - None registered.

Insecticides - None registered.

Fertilizers - None registered.

Restrictions:

Rainfall: Within three hours may result in reduced control.

Grazing: Do not graze or harvest treated crop.

Preharvest: Do not apply within 60 days of harvest.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

When finished spraying Laser, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in tank for several hours (preferably overnight). Scrub inside surfaces of tank but do not enter the spray tank. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.

If in eyes, flush with water immediately for 15 minutes.

If swallowed, get medical help immediately. Do not induce vomiting.

Hazard Rating:

Caution Poison

Laser DF

Formulation:

The Laser DF package contains two containers labelled 'Greenfox' and 'DF'.

Greenfox contains 28 g/L fenoxaprop-p ethyl and 336 g/L MCPA ester. Container size - 10.1 L.

DF contains 75 per cent thifensulfuron. Container size - 162 grams.

Crops:

Spring wheat (except durum).

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

2 leaf stage through tillering.

Weed Stage:

1 to 6 leaf stage of green and yellow foxtail (total number of leaves including tillers) and chickweed. Cotyledon to 4 leaf stage of annual sunflower, ball mustard, burdock,

cocklebur, field horsetail, flixweed, kochia, prickly lettuce, ragweeds, Russian pigweed, shepherd's purse, wild radish. Cotyledon stage to 4 inches (10 cm) tall or across of corn spurry, cow cockle, green smartweed, hemp nettle, lamb's-quarters, redroot pigweed, Russian thistle, stinkweed, volunteer rapeseed, wild mustard. 1 to 3 leaf stage of wild buckwheat.

Weed Resistance Note:

Populations of green foxtail, which is resistant to a group of herbicides which includes Laser DF, have been identified in Manitoba. These populations developed following use of Group 1 herbicides year after year on the same field. See, 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$10.61/acre (1991 suggested retail price).

Rate:

Apply Greenfox at 0.51 L/acre and DF at 0.008 kg/acre. One jug of Greenfox (10.1 L) and one container of DF (0.162 kg) treats 20 acres.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi). Use 310 kPa (45 psi) when using check valves.

Nozzles:

80 degree or 110 degree flat fan tilted forward at a 45 degree angle. Screens and filters 50 mesh or coarser.

Effects of Weather:

Do not apply to crop that is stressed by severe weather (if daytime temperatures exceed 28°C or falls below 12° C), frost, low fertility, drought, water-saturated soil, disease or insect damage as crop injury and/or poor weed control may result. Crop yellowing may occur when hot temperatures and/or high humidity prevails at the time of spraying. Poor weed control will result if weeds are too large, if coverage is poor or if weeds are not actively growing. Application of the spray at a forward angle of 45 degrees will result in better penetration of the canopy and better coverage.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within two hours of application will reduce control.

Grazing: Do not graze treated fields prior to harvest.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze. If stored for one year or longer, shake well before using.

Tank Cleaning:

When finished spraying Laser DF, run clean water through the tank, pump and lines. Drain and refill with 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Caution:

Do not use ammonia with chlorine bleach. Using ammonia with chlorine bleach will release a gas with a musty chlorine odour which may cause eye, throat and lung irritation.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.

If in eyes, flush with water immediately for 15 minutes.

If swallowed, get medical help immediately. Do not induce vomiting.

Hazard Rating:

Danger Poison

Lexone/Sencor

Formulations:

Lexone DF - 75 per cent metribuzin formulated as a dry flowable. Sencor 500F - 50 per cent metribuzin formulated as a flowable. Sencor Solupak 75 DF - 75 per cent metribuzin formulated as a dry flowable. Sencor 75 DF - 75 per cent metribuzin formulated as a flowable.

Crops:

Barley, wheat (spring and durum), winter wheat (Northstar only), fababeans, lentils (Sencor only), peas, soybeans (KG20 and McCall only), triazine tolerant canola, (Sencor only) potatoes (except varieties Belleisle, Shepody, and Tobique and red-skinned varieties).

Weeds:

See charts in Section I for a list of weeds controlled.

Weed Stage:

Preemergence.

Post-emergence applications should be made when weeds are small-2 inches (5cm) in height or diameter

Split applications (post-emergence on lentils) - cotyledon to 2-leaf stage of weeds.

Cost:

Cereals, lentils, peas - $ 9.08 - 10.00/acre.

Potatoes - $ 10.64/acre.

Water Volume:

Preplant incorporated - 7 to 10 gallons/acre (30 to 40 L/acre).

Post-emergence applications - Cereals - 10 gallons/acre (45 L/acre). Lentils, peas, triazine tolerant canola - 15 gallons/acre (70 L/acre).

Pressure:

200 - 275 kPa (30 to 40 psi).

Nozzles:

Flat fan nozzles with opening no smaller than 8002 or TK2 with 50-mesh screens. Angle nozzles 45 degrees forward.

Effects of Weather:

Crop height reductions or yellowing may occur if high temperatures occur within 48 hours of application. Cold, cloudy weather or frost within three days of application will also aggravate injury.

Crop Stage:

CROP	APPLICATION TIMING
Barley, Wheat	2 to 5 leaf stage.
Triazine tolerant canola	Preplant incorporated or post-emergence – at least 75 days before harvest
Peas	Up to 6 inches (15 cm) of vine length
Lentils	3 to 6 inches (75 to 15 cm) of vine length
Potatoes	Preplant incorporated or post-emergence – from ground crack until 60 days prior to harvest
Soybeans	Preplant incorporated
Fababeans	Preplant incorporated

Tank Mixes:

Herbicides: In wheat or barley, may be tank mixed with Banvel or 2,4-D. In potatoes (preplant incorporated) must be applied as a tank mix with Eptam 8E. In fababeans, must be applied as a tank mix with Treflan EC. In soybeans, Sencor 500F must be applied as a tank mix with Treflan EC.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within six hours may reduce control.

Grazing: Do not graze treated cereal crops within 30 days of application, or peas within 70 days after application.

Preharvest: Do not harvest barley, wheat or potatoes within 60 days of application. Do not harvest lentils within 70 days of application. Do not harvest triazine-tolerant canola within 75 days of application.

Recropping: Preplant incorporated treatments may leave a residue in the soil which will affect succeeding

Rates:

CROP	APPLICATION	RATES (kg or L/acre)
Barley, peas	Post-emergence	Sencor 500F - 0.172 to 0.223 Sencor 75DF - 0.111 to 0.152 Lexone DF - 0.111 to 0.152
Wheat, triazine tolerant canola	Post-emergence	Sencor 500F - 0.172 Sencor 75DF - 0.111
Lentils	Post-emergence Split-applications	Sencor 500F - 0.172 Sencor 75DF - 0.111 First application of Sencor 500F - 0.08 to 0.11 Sencor 75DF - 0.06 to 0.08 Second application 7 to 10 days later with rates within these ranges.
Potatoes	Post-emergence	Sencor 500F - 0.222 Sencor 75DF - 0.151 Lexone 75DF - 0.151
Potatoes	Pre-plant incorporated: (Apply only when tank mixed with Eptam 8-E)	Sencor 500F - 0.222 to 0.343 Sencor 75DF - 0.151 to 0.222 Lexone DF - 0.142 to 0.223
Fababeans	Preplant incorporated: (Apply only when tank mixed with Treflan EC)	Sencor 500F - 0.223 to 0.344 Sencor 75DF - 0.152 to 0.223 Lexone DF - 0.142 to 0.223
Soybeans	Preplant incorporated: (Apply only when tank mixed with Treflan EC)	Sencor 500F - Apply 0.172 to 0.223 L/acre on soils with 2 to 6 per cent organic matter. Apply 0.223 to 0.344 L/acre on soils with 6 to 10 per cent organic matter.

crops due to higher rates of product used. Do not seed rapeseed (canola), sunflowers, sugar beets, onions, celery, peppers, cole crops, lettuce, spinach, red beets, turnips, pumpkin, squash, cucumbers or melons the year after treatment. Fall seeded crops may be injured when seeded the same year as preplant or post-emergence application of these products.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining spray solution from the spray tank. Rinse the spray tank and refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for five minutes and spray out. Repeat this procedure twice. Fill the spray tank with clean water, recycle for five minutes, and spray out. Clean pump and nozzle screens thoroughly. Wash away any spray mixture from the outside of the spray tank, nozzles or spray rig.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting. Get medical help immediately.

Lontrel

Formulation:

200 g/L clopyralid formulated as a solution. Container size - 4 L.

Crops:

Rapeseed (including canola and Triazine tolerant canola), wheat, oats, barley, flax, summerfallow.

Seedling and established grasses for forage and seed production (including Kentucky bluegrass, smooth bromegrass, reed canary grass, creeping red fescue, meadow fescue, tall fescue, meadow foxtail, orchard grass, altai wild ryegrass, Russian wild ryegrass, timothy, crested wheatgrass, intermediate wheatgrass, slender wheatgrass and streambank wheatgrass), tall wheatgrass for forage only.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Barley, wheat (spring and durum), oats, - 3 to flag leaf stage;

Seedling forage grasses - 2 to 4 leaf stage

Established grasses up to shot-blade stage, in the fall after harvest, or in early spring.

Flax - 2 to 4 inches (5 to 10 cm) in height

Weed Stage:

Annual weeds 2 to 4 leaf stage; Canada thistle - after all thistles have emerged and when the majority are 4 inches (10 cm) tall but prior to bud stage.

Cost:

$12.48 - 37.71/acre (1991 suggested retail prices).

Water Volume:

10 to 20 gallons/acre (45 to 90 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

Rate:

CROP	RATE (L/ACRE)	ACRES TREATED PER 4 L CONTAINER
Rapeseed (canola)	0.3 - 0.61	13 - 6.7
Flax	0.405 - 0.61	10 - 6.7
Barley, Oats, Wheat	0.3	13
Summerfallow	0.61	6.7
Seedling and established grasses (see list under "Crops")	0.3 - 0.61	13 - 6.7

The 0.3 rate will give top growth control of Canada thistle. For season-long control of Canada thistle use the 0.61 rate in rapeseed, flax, and grasses.

Effects of Weather:

Poor control may occur under dry conditions. Injury to flax may occur when tank mixing with MCPA. To reduce the risk of crop injury do not apply tank mixes if temperature exceeds 27 °C.

Tank Mixes:

Herbicides - If using products containing bromoxynil (such as Buctril M, Pardner, HoeGrass II) in the same field, Lontrel applications must be delayed for at least 14 days after treatment with these products to allow Canada thistle to recover from leaf burn.

Rapeseed - Lontrel can be mixed with Poast, Hoegrass 284 or Fusilade. Use the lower rate of Lontrel in tank mixes with Hoegrass 284.

Flax - Lontrel at 0.30 L/acre may be tank mixed with MCPA amine or ester. Use 0.34 to 0.45 L/acre MCPA formulations containing 500 g/L. For product volumes of fomulations with different strengths refer to MCPA.

Wheat, Barley - Lontrel at 0.202 to 0.3 L/acre may be tank mixed with 2,4-D amine or ester or MCPA amine or ester. Apply Lontrel/MCPA mixtures at the 3 leaf to flag leaf stage of the crop, Lontrel/2,4-D at the 4 leaf to flag leaf stage of the crop.

Oats - Lontrel at 0.202 to 0.3 L/acre may be tank mixed with MCPA amine or ester. Use 0.51 to 0.69 L/acre MCPA formulations containing 500 g/L. For product

volumes of formulations with different strengths refer to MCPA.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within eight hours will reduce control.

Grazing: Immature crops may be grazed or harvested for feed seven days after treatment. Do not graze grasses or cut for hay within 60 days of treatment (see list of grasses above).

Recropping: Lontrel residues in the soil may affect succeeding crops. Replant to wheat, barley, oats, rye, flax or rapeseed. Do not sow lentils or potatoes into fields treated with Lontrel until the third growing season after the year of treatment. Do not use manure from animals fed Lontrel-treated straw except on fields which are to be sown to Lontrel tolerant crops.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Mataven L

Formulation:

52.5 g/L of flampropmethyl formulated as an emulsifiable concentrate.

Container Size - 10 L.

Crops:

Wheat (winter and spring), triticale, canarygrass, alfalfa, sunflowers and seedling forage grasses. Use only on Canada Western Spring wheat varieties recommended in the 1992 Field Crop Variety Recommendations. Do not use on Canada Prairie Spring.

Weeds:

See the charts in Section I for a list of weeds controlled.

Crop Stage:

Wheat, triticale, canarygrass - up to and including the 6 leaf stage.

Alfalfa and forage grasses - in the year of seeding.

Sunflowers - before crop forms a canopy.

Weed Stage:

3 to 6 leaf stage of wild oats.

Cost:

$ 15.35/acre (1991 suggested retail price).

Rate:

Apply:

CROP	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Wheat, triticale, canaryseed, alfalfa, forage grasses (with companion crop)	2.02	5
Sunflowers	2.02 - 2.63	5 to 3.8
Forage grass (no companion crop)	3.04	3.3

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

300 kPa (45 psi).

Nozzles:

Flat fan directed 45 degrees forward.

Effects of Weather:

Wild oat control may be less than acceptable if cold or dry conditions persist for one week preceding application. Best control under high relative humidity.

Tank Mixes:

Herbicides - None registered.

Fertilizer - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within two hours will reduce control.

Grazing: Do not graze or feed treated crops before maturity. Straw can be used for bedding or feed after harvest of the crop. Do not graze or harvest forage grasses or alfalfa for feed in the year of treatment.

Recropping: No restrictions the year after application.

Aerial Application: May be applied by air in a minimum of 1.3 gallons/acre (6 L/acre) water volume.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make a recommendation.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.

If in eyes, flush with water immediately for 15 minutes.

If swallowed, get medical help immediately.

MCPA

Formulations:

500 g/L amine, 300 g/L sodium salt and 400 g/L potassium salt formulated as solutions;

444 and 500 g/L ester formulated as emulsifiable concentrates.

Container size - various.

Crops:

MCPA amine	Wheat, barley, oats, flax, rye, cereals underseeded with alfalfa (except Flemish varieties), red clover, alsike clover, grass pastures.
MCPA ester	Wheat, barley, oats, rye, flax
MCPA K	Wheat, barley, oats, flax
MCPA sodium salt	Wheat, barley, rye, oats, flax, winter wheat, peas (field and canning), cereals underseeded to alfalfa (except Flemish varieties), red clover, alsike clover

Weeds:

See charts in Section I for a list of weeds controlled.

Weed Stage:

2 to 4 leaf stage.

Weed Resistance Note:

Populations of wild mustard, which are resistant to MCPA, have been identified in Manitoba. These populations of wild mustard developed following use of Group 4 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

MCPA amine - $1.08 - 3.48/acre

MCPA ester - $2.68 - 3.73/acre

MCPA sodium salt - $1.66 - 4.55/acre

MCPAK - $3.61/acre (1991 suggested retail price).

Crop Stage:

CROP	STAGE
Wheat (spring and durum), barley, oats	3 leaf to early shot blade.
Spring rye	2 leaf to early shot blade.
Fall rye	After growth commences in the spring but before the early shot blade stage.
Winter wheat	Spring application only. Apply from the time winter wheat commences growth until the early shot blade stage.
Flax	2 inches (5 cm) in height to prebud stage.
Peas	Vines 4 to 7 inches (10 to 18 cm) long.
Alfalfa (except Flemish varieties), alsike clover, red clover	Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage.
Grass pastures	Spring or fall.

Water Volumes:

Cereals - 5 to 22 gallons/acre (25 to 100 L/acre).

Flax - 10 to 22 gallons/acre (45 to 100 L/acre).

Peas - 15 gallons/acre (70 L/acre).

Cereals underseeded to alfalfa, red and alsike clover - 15 to 20 gallons/acre (70 to 90 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Best weed control occurs when temperatures are above 21 °C and humidity is above 70 per cent. Do not apply if temperature exceeds 27 °C. If applying to flax, injury and a delay in maturity may result from application under hot or humid conditions. Extremely hard water may reduce performance or cause problems in spraying the product.

Rates:

CROP	MCPA amine (500 g/L) L/acre	MCPA ester (500 g/L) L/acre	MCPA K (400 g/L) L/acre	MCPA Sodium salt (300 g/L) L/acre
Barley, oats, wheat (spring and durum)	0.51 to 0.71	0.51 to 0.71	0.85	0.51 to 0.71
Spring rye	0.51 to 0.71	0.51 to 0.71	not registered	0.81 - 1.11
Flax	0.51 to 0.71	0.51 to 0.71	0.85	0.81 - 1.11
Winter wheat, fall rye	0.22 to 0.44	not registered	not registered	0.81 - 1.11
Peas	not recommended	not recommended	not recommended	0.405
Cereals underseeded to alfalfa, red and alsike clover	not registered	not registered	not registered	0.405
Pastures	0.81	not registered	not registered	not registered

Use the higher rates under dry or cool weather conditions or with heavy weed infestations.

Tank Mixes:

Herbicides: See next table. Not all brands are labelled for tank mixing. Check the product label prior to use. Follow all precautions and restrictions on both labels.

Fertilizer - None.

Insecticides - None.

Restrictions:

Rainfall: Within six hours of MCPA Sodium Salt or MCPAK, four hours of MCPA Amine or two hours of MCPA ester application will reduce control.

Grazing: Do not graze dairy cattle within seven days after application.

Recropping: No restrictions the year after application.

Aerial Application: Some amine and MCPAK products may be applied by air. Check the label for detailed instructions.

Storage: MCPA Ester may be frozen. Do not freeze MCPA Amine, MCPA Sodium Salt and MCPAK.

Tank Cleaning:

Some manufacturers indicate that spray equipment which has come in contact with MCPA may cause damage to susceptible crops. Restrict use of these products to crops on which MCPA is registered.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Hazard Rating:

Warning Poison

CROP	MCPA AMINE	MCPA ESTER	MCPAK	MCPA Sodium salt
Wheat	Afolan L, Banvel, Buctril M, Lexone, Lontrel, Lorox L, Pardner, Refine	Assert 300 LC, Avenge, Avenge + Pardner, Lontrel	Banvel, Buctril M, Pardner	Buctril M
Barley	Afolan F, Banvel, Buctril M, Lexone, Lontrel, Lorox L, NaTA TCA, Pardner, Refine	Assert 300 LC, Avenge, Avenge + Pardner, Buctril M, Lontrel	Banvel, Buctril M, Pardner	Buctril M
Oats	Afolan F, Banvel, Buctril M, Lorox L, Lontrel, Pardner, Refine, TCA	Buctril M, Lontrel	Banvel, Buctril M, Pardner	Buctril M
Rye	None	None	None	None
Winter wheat	Pardner, Refine	Avenge	Pardner	None
Flax	Poast + Assist, Poast + Merge, NaTA TCA, Lontrel	Poast + Assist, Poast + Merge, Lontrel	TCA	None
Peas	Not recommended	Not recommended	Not recommended	TCA
Cereals underseeded to alfalfa, red clover and alsike clover	None	None	None	None

Muster

Formulation:
75 per cent ethametsulfuron methyl formulated as a dry flowable. Container size - 320 grams.

Crop:
Canola (rapeseed).

Weeds:
See charts in Section I for a list of weeds controlled.

Crop Stage:
Crop must be in the 2 leaf stage (true leaves) or later. Do not apply prior to this stage as severe crop injury can occur. Spraying must take place at least 60 days prior to harvest.

Weed Stage:
2 to 6 leaf stage. Stinkweed must be sprayed in the 2 to 4 leaf stage.

Cost:
$ 12.00 to 18.00/ acre (1991 suggested retail price).

Rates:
Apply 0.008 kg/acre Muster. Add Agral 90, Agsurf or Citowett Plus at a rate of 0.2 L per 100 L spray solution

Controls wild mustard, hemp nettle, smartweed, spring seedlings of flixweed, and suppresses stinkweed. (One container treats 40 acres at this rate.) Apply 0.012 kg/acre Muster. Add Agral 90, Agsurf or Citowett Plus at a rate of 0.2 L per 100 L spray solution to control wild mustard, hemp nettle, smartweed, stinkweed and suppress red root pigweed. (One container treats 26.7 acres at this rate.)

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

200 to 275 kPa (30 to 35 psi).

Equipment and Nozzles:

80 degree nylon or stainless steel flat fan nozzles. Sprayer must be equipped with continuous agitation. Use 50 mesh strainers and screens.

Effects of Weather:

Do not use on canola that is stressed due to drought or flooding. Less than acceptable control will occur on fields where high populations of wild mustard exist and where stressful environmental conditions prevail (drought, cold weather).

Tank Mixes:

Herbicides: Muster may be tank mixed with Poast and with Assure. Muster must be added to the tank first, then the Poast or Assure.

Fertilizer: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within six hours will reduce control.

Grazing: Do not graze or feed crop to livestock within 60 days of application.

Recropping: Do not sow wheat, barley, oats or flax within 10 months of application. Do not sow canola, lentils, peas, fababeans, or tame mustard within 22 months of application. All other crops must not be sown until a 'field bioassay' is performed at 22 months (or more) after application.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

Run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in tank for several hours (preferably overnight). Scrub inside surfaces of tank but do not enter the spray tank. Flush the sprayer with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.

If in eyes, flush with water immediately for 15 minutes.

If swallowed, get medical help immediately.

Hazard Rating:

Caution Poison

Pardner

Formulation:

280 g/L bromoxynil
Container size 20 L

Crops:

Barley
Oats
Fall rye
Triticale
Wheat (durum, spring and winter)
Canary seed
Corn (field and sweet)
Zero or minimum tillage
Chemical fallow

Seedling grasses, for seed production only (brome grass, crested wheatgrass, intermediate wheatgrass, slender wheatgrass, tall wheatgrass, Russian wild ryegrass, timothy, orchard grass, creeping red fescue, meadow fescue, reed canary grass)

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

CROP	STAGE
Barley, oats, triticale, wheat (spring and durum)	2 leaf to early flag
Fall rye and winter wheat	first growth to early flag
Corn (field or sweet)	4 to 8 leaf
Corn (field or sweet) drop pipes	beyond 8 leaf
Canary seed and seedling grasses	3 to 5 leaf

Weed Stage:

Cotyledon to 4 leaf stage. Kochia and Russian thistle must be sprayed before plants are 2 inches (5 cm) high.

Cost:

$5.59 - 6.70/acre (1991 suggested retail price).

Rate:

0.405 to 0.485 L/acre (one container treats 50 to 40 acres) except for canary seed - 0.405 L/acre (one container treats 50 acres).

Water Volume:

Corn - 18 to 27 gallons/acre (80 to 120 L/acre).
Seedling Grasses - 13 gallons/acre (60 L/acre).
Other crops - 10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Avoid spraying in temperatures greater than 25°C. Temporary leaf scorching may occur in corn if applied after adverse growing conditions, such as cool and wet or hot (greater than 27 °C) and humid weather.

Tank Mixes:

Herbicides - wheat and barley: may be tank mixed with MCPA, MCPAK and 2,4-D.

- Oats, fall rye, canary seed and seedling grasses: may be tank mixed with MCPA ester and MCPAK.

- Minimum or zero till: may be tank mixed with 0.45 L/acre Laredo, Roundup, or Wrangler plus non ionic surfactant.

- Chemical fallow: may be tank mixed with 0.30 - 0.405 L/acre Laredo, Roundup or Wrangler plus non ionic surfactant.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within one hour of application will reduce control.

Grazing: No restrictions except on seedling forage grasses which may not be grazed or harvested for livestock feed in the year of treatment.

Recropping: No restrictions on crops grown after application.

Aerial Application: Do not apply by air.

Storage - May be stored at freezing temperatures. Will return to original state by warming to room temperature, 20 to 22 ° C (68 - 72 ° F), and agitating thoroughly.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately. Do not induce vomiting.

Hazard Rating:

Warning Poison

Poast

Formulation:

184 g/L of sethoxydim formulated as an emulsifiable concentrate. Container size - 7 L.

Crops:

Flax, canola, field beans, soybeans, fababeans, lentils, peas, creeping red fescue (seedling), seedling and established stands of alfalfa, sweet clover (seed production only) and alsike clover - (seed production only).

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Seedling creeping red fescue - 2 to 4 leaf stage. Broadleaf crops are tolerant at all growth stages. However, the preharvest interval outlined in the table below must be followed to avoid unacceptable residues of sethoxydim in harvested crops:

CROP	Maximum Rate (L/acre)	Application Interval to Harvest (days)
Rapeseed	1.78	70
Snap common beans	0.77	56
Sugarbeets	1.78	85
Potatoes	1.78	80
Dry common beans (white, kidney, pinto)	1.78	80
Dry peas	1.78	60
Flax	1.78	60
Soybeans	1.78	80
Lentils	1.78	65

Weed Stage:

2 to 5 leaf stage of annual grasses.

Quackgrass - 1 to 3 leaf stage.

Weed Resistance Note:

Wild oats and green foxtail, which are resistant to a group of herbicides including Poast, have been identified in Manitoba. These populations of wild oats and green foxtail developed following use of Group 1 herbicides year after year on the same field. See, 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$11.00 to 37.35/acre (1991 suggested retail price).

Rates:

WEED	RATE (L/acre)	ACRES TREATED per 7 L Jug
Green or yellow foxtail, barnyard grass, proso millet, witchgrass and volunteer corn	0.324 - 0.405	21.6 - 17.3
Wild oats	0.44	16
Volunteer wheat and oats	0.44	16
Volunteer barley	0.44	16
Quackgrass suppression	1.1	6

Add Merge at a rate of 1 L per 100 L spray solution for annual grass control. Use 2 L per 100 L spray solution for quackgrass suppression.

Water Volume:

5 to 20 gallons/acre (25 to 90 L/acre). Use a minimum of 10 gallons/acre (45 L/acre) if crop or weed growth is dense, and when spraying quackgrass.

Pressure:

275 kPa to 300 kPa (40 to 45 psi).

Nozzles:

Stainless steel 80 degree flat fan nozzles.

Effects of Weather:

Most effective control will be achieved when grasses are actively growing. Do not apply to grasses stressed more than 20 days due to lack of moisture. Do not apply if temperatures are below 15°C. Retillering may occur under stress conditions or if fertility is low.

Tank Mixes:

Herbicides - Flax: Poast can be mixed with Buctril M or MCPA (amine or ester). Include Merge at recommended rates in these tank mixes. Tank mixing Poast with these products may reduce grass control, especially under adverse environmental conditions. Loss in grass control is more pronounced with MCPA amine than with MCPA ester.

Triazine Tolerant Canola - Poast + Bladex L. Use the rates which are recommended for each product when sprayed alone. To mix, fill the tank to one quarter with water, add Bladex L then add more water. With agitation lines running, add Poast and Merge. Some temporary crop injury (leaf burn) may occur from Poast/Bladex mixes.

Rapeseed (including canola and triazine-tolerant varieties): Poast may be tank mixed with Lontrel at rates recommended for each product when sprayed alone. Poast may also be tank mixed with Muster.

Allow four days between application of Poast and application of herbicides other than those registered for tank mixing.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within one hour of application, may reduce control.

Grazing: Do not graze or harvest for feed prior to crop maturity.

Recropping: Do not sow grass crops within 14 days of Poast application.

Aerial Application: May be applied by air in 2.2 to 4.4 gallons/acre (10 to 25 L/acre).

Storage: May be frozen.

Tank Cleaning:

When finished spraying Poast, run clean water through the tank, pump and lines. Drain. Refill sprayer with clean water and 1 L of household ammonia per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in the tank for several hours (preferably overnight). Scrub inside surfaces of tank but do not enter the spray tank. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water.
If in eyes, flush with water immediately for 15 minutes.
If swallowed and the victim is conscious, administer water or milk but do not induce vomiting. Get medical help immediately.

Hazard Rating:

Caution Poison

Princep Nine-T/Simadex 80W/Simazine 80W

Formulations:

Princep Nine-T - 90 percent simazine formulated as a water dispersible granular.

Simadex 80W/Simazine 80W - 80 percent simazine formulated as wettable powder.

Crops:

Established alfalfa, established bird's-foot trefoil.

Control of aquatic weeds in dugouts.

Weeds:

See charts in Section I for a list of weeds controlled.

Timing:

Established forage crops. Do not use in year of seeding. Apply after September 1 but before freeze-up.

For aquatic weed control in dugouts, apply when growth is present in spring.

Weed Stage:

Pre-emergence in forage crops.

Post-emergence in farm dugouts.

Rate:

In forage crops, apply Princep Nine-T - 0.445 kg/acre.

Simadex 80W/Simazine 80W - 0.61 kg/acre.

For filamentous algae control, apply 0.23 kg of Princep Nine-T or 0.27 kg of Simazine 80W. per 100,000 gallons of water.

For control of submerged aquatics, apply 0.46 kg of Princep Nine-T or 0.54 kg of Simazine 80W per 100,000 gallons of water.

Water Volume:

25 gallons/acre (120 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan nozzles with 50-mesh nozzle screens.

Effects of Weather:

For applications to forage stands, dry soil conditions at the time of weed emergence may result in reduced weed control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Moderate rainfall after application en-hances activity.

Grazing: In forage stands, allow 30 days between application and grazing, 60 days between application and cutting for feed.

Dugout applications - water may be used for animal consumption.

Environmental: Do not use water from Princep/Simazine 80W treated dugouts for human consumption or for irrigation for one year after application.

Recropping: Do not sow treated fields to any crop the year after application.

Aerial Application: Do not apply by air.

Storage: May be frozen. Store in a cool, dry place.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, give large amounts of water to drink and induce vomiting. Get medical attention immediately.

Refine

Formulation:

75 per cent thifensulfuron formulated as a dry flowable. Container Size - 320 grams.

Crops:

Barley, oats, wheat.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

2 leaf to shot blade.

Weed Stage:

Less than 4 inches (10 cm) tall or across. For chickweed apply in the 1 to 6 leaf stage before the crop shields the weeds. For wild buckwheat apply in the 1 to 3 leaf stage.

Weed Resistance Note:

Populations of kochia, which are resistant to a group of herbicides including Refine, have been identified in Manitoba. These populations developed following the use of Group 2 herbicides year after year on the same land area. See, 'Resistance of Weeds to Herbicides' (page 12) for further information on minimizing the risk of developing weed resistance on your farm.

Cost:

$3.80/acre (1991 suggested retail price).

Rate:

0.008 kg/acre (one container treats 40 acres). Add Agsurf, Agral 90 or Citowett Plus at 0.2 L per 100 L of spray solution.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:
275 kPa (40 psi).

Nozzles:
Flat fan nozzles with 50 mesh line strainers and screens.

Effects of Weather:
Do not apply to wheat, barley or oats that are stressed by severe weather conditions (frost, drought, or water saturated soil) as crop injury may result.

Under certain conditions (such as heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop color and reduction in crop height may occur.

Tank Mixes:
Herbicides - Refine may be tank mixed with 0.405 L/acre of MCPA amine 500 plus a recommended surfactant to control ragweed and suppress Canada thistle.

Refine may be tank mixed with HoeGrass 284 for use on wheat (spring, winter and durum) and barley (except varieties Klages, Norbert and Betzes.) Use 1.01 to 1.13 L/acre HoeGrass 284. This tank mix does not control green or yellow foxtail. Do not add surfactant.

Fertilizers - None.

Insecticides - None.

Restrictions:
Rainfall: Within six hours will reduce control.

Grazing: Must not be grazed or fed to livestock for seven days after treatment.

Recropping: None the year after treatment.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:
When finished spraying Refine, run clean water through the tank, pump and lines. Refill sprayer with clean water and 1 L of household ammonia per 100 L of water. Circulate the solution through lines and nozzles. Let solution sit in tank for several hours (preferably overnight). Scrub inside surfaces of tank, but do not enter the spray tank. Flush sprayer system with water until thoroughly clean. Remove and clean nozzles and screens.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:
When spraying, wear;

long-sleeved shirt/long pants

coveralls

chemical-resistant boots and gloves (unlined neoprene or nitrile)

wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:

impermeable apron

goggles.

First Aid:
If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Hazard Rating:
Caution Poison

Refine W.O.
See HoeGrass/Refine tank mix under 'HoeGrass 284'.

Resolve
See Poast/Muster tank mix under 'Poast'.

Reglone

Formulation:
200 g/L diquat formulated as a liquid.
Container size - 10 L.

Crops:
Dry beans, soybeans, peas, flax, lentils, tame mustard, rapeseed (including canola), sunflowers, potatoes, alfalfa (for seed), bird's-foot trefoil (for seed), red clover (for seed).

Weeds:
Chemically dries down all green vegetation (including crop) present at the time of harvest.

Weed Stage:
Reglone will burn off green tissue on weed growth, regardless of stage.

Costs:
$10.07 - 28.05/acre (1991 suggested retail price).

Crop Stage:
Add 0.1 L of Agral 90 per 100 L spray solution for all applications.

CROP	STAGE
Dry beans, soybeans	When crop has lost 80 to 90 percent of leaves
Flax	75 percent of bolls brown
Lentils	When lowest pods are light brown and rattle if shaken
Mustard	When 75 percent of seed has turned brown
Rapeseed (canola)	When 60 to 75 percent of seed has turned brown
Sunflowers	When backs of sunflower heads and bracts are turning yellow and seed moisture is less than 40 percent moisture
Potatoes	Two weeks prior to harvest
Alfalfa (for seed), Bird's-foot trefoil (for seed), Red clover (for seed)	No more than 7 days prior to harvest

Rates:

CROP	RATE (L/acre)	
	Ground Applied	Aerial Applied
Dry beans, soybeans, canola, flax, lentils, mustard, peas, sunflowers (average crop, few weeds)	0.6 to 0.8	0.8
Dry beans, soybeans, canola, flax, lentils, mustard, peas, sunflowers (dense crop, heavy weed infestations)	0.8 to 1.1	1.1
Potatoes (light stands, few weeds)	0.8 to 1.1	1.1
Potatoes (dense crop, heavy weed infestations)	1.7	1.7
Alfalfa, bird's-foot trefoil, red clover	0.6 to 0.8	not registered

Water Volumes:

Ground applications - 20 to 45 gallons/acre (90 to 200 L/acre).

Aerial applications - 4.4 to 5.5 gallons/acre (20 to 25 L/acre).

Use the highest water volumes when crop canopy is heavy or if weed growth is dense.

Pressure:

Ground application - 30 to 40 psi (200 to 275 kPa).

Effects of Weather:

Best results under cloudy conditions.

Tank Mixes:

Herbicides - None registered.

Fertilizers - None registered.

Insecticides - None registered.

Restrictions:

Rainfall: Within one hour of application may reduce effectiveness.

Grazing: Do not graze or harvest treated forage for livestock feed.

Aerial Application: May be applied by air in a minimum of 4 gallons/acre (45 L/acre) water volume for rapeseed, sunflowers, field peas and mustard. For potatoes, dry beans and soybeans, use a minimum of 3 gallons/acre (35 L/acre).

Recropping: No restrictions the year after application.

Storage: Do not freeze.

Tank Cleaning:

When finished spraying Reglone, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and Agral 90 at 0.6 L per 1,000 L spray solution. Scrub inside surfaces of tank but do not enter tank. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting. Get medical help immediately.

Hazard Rating:

Caution Poison

Reglone A

Formulation:

200 g/L diquat. Container sizes - 2 L and 5 L jugs.

Use:

Control of water weeds in farm dugouts.

Application Timing:

Mid-May through late June.

Rates:

Dugouts less than 5 ft. (1.5 m): Apply 8.9 L/acre. At this rate, 2.6 L of Reglone A will treat a dugout which is 160 feet by 80 feet (49m x 24.4 m)

Dugouts more than 5 ft (1.5 m): Apply 12.1 to 14.2 L/acre. At these rates, a dugout which is 160 feet by 80 feet (49m x 24.4m) will require 3.6 to 4.2 L of Reglone A.

Equipment:

Apply as a broadcast surface application.

Restrictions:

Environmental: To protect fish if weed growth is dense, do not treat more than one-fourth of dugout at one time.

Grazing: Do not use water for animal consumption for 24 hours after application.

Irrigation: Do not use water for irrigation for 5 days after application.

Domestic Use: Do not use water for human consumption for 24 hours after application.

Storage: Do not freeze.

Protective Equipment:

When spraying wear:
long sleeved shirt/long pants coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile wide brimmed hat)

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles

First Aid:

If product contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting. Get medical help immediately.

Roundup/Laredo/Wrangler

Formulations:

356 g/L glyphosate formulated as an isopropylamine salt.

Container sizes - 10 L, 115 L, 400 L.

Use Rates and Timing:

1. **Annual weed control (prior to crop emergence).**

   Apply 0.91 L/acre to actively growing grassy and broadleaf weeds less than 6 inches (15 cm) tall. Apply 1.4 L/acre to weeds greater than 6 inches (15 cm) tall. Allow at least three days after treatment before tillage.

2. **Annual Weed Control in minimum tillage wheat, oats and barley (prior to crop emergence).**

   For control of wild oats, green foxtail, volunteer cereals and wild mustard less than 6 inches (15 cm) tall, apply 0.45 L/acre plus 0.14 L/acre non-ionic surfactant (Agral 90, AgSurf, Tween 20).

   For control of wild oats, green foxtail, volunteer cereals, wild mustard, wild buckwheat and lady's thumb, may be tank mixed with 0.57 L/acre of Pardner.

3. **Annual Weed Control in Summerfallow**

   Apply 0.3 to 0.4 L/acre plus 0.14 L/acre non-ionic surfactant (Agral 90, AgSurf, Tween 20) to actively growing grassy and broadleaf weeds less than 3 inches (8 cm) tall. May be tank-mixed with Banvel, Pardner or 2,4-D for control of additional weeds. (See 'Summerfallow' Chart in Section I for a list of labelled weeds). Allow at least three days after treatment before tillage.

4. **Quackgrass Control Prior to Seeding or After Harvest**

   Apply 2.83 L/acre if quackgrass is sodbound (Quackgrass may become sodbound if it has been left for two or more years in an undisturbed situation). Apply 1.92 L/acre to moderate infestations where long-term control is required. Apply 1.01 L/acre for season-long control of light to moderate infestations. Apply when quackgrass is eight inches (20 cm) tall and actively growing. Applications may be made in either spring or in fall.

   Cultivation prior to application of these products will result in reduced control. Do not cultivate between harvest and treatment when using fall applications. If using spring applications of these products on fields which have been fall-tilled, delay application until the quackgrass reaches the 5-leaf stage (This will occur approximately one month later on fall-tilled fields than in undisturbed fields.) Cultivation after application usually will improve control of quackgrass. Wait a minimum of 5 days after spraying, then cultivate.

Crops:

CROPS	USE
All crops	Annual weed control in spring, prior to crop emergence
Barley, oats, wheat, corn, soybeans, forage legumes, forage grasses	Patch treatment (in crop control of perennial weeds)
Flax	Preharvest (Roundup only)
All crops	Quackgrass, Canada thistle suppression (fall stubble)
Summerfallow, shelterbelts	Annual and perennial weed control

5. **Canada Thistle Control in Summerfallow, Shelterbelts.**

   Apply 1.92 to 2.8 L/acre when Canada thistle is at bud stage. Allow a minimum of five days after application before tillage. Rates may be reduced to 1.0 L/acre if application on Canada thistle rosettes is made in late summer. To ensure proper timing, conduct summerfallow tillage until July 15 to August 1. Allow the thistles to regrow for five weeks following last tillage. When the weeds reach a diameter of 6 inches (15 cm) and are in the rosette stage, apply 1.0 L/acre. Wait a minimum of 10 days after application prior to tillage. Direct spray away from trees when using in shelterbelts.

6. **Patch Treatments of Perennial Weeds** in wheat, oats, barley, corn, soybeans, forage legumes and forage grasses

   Apply to patches of perennial weeds as listed in the next table:

7. **Preharvest Suppression** of quackgrass, Canada thistle and sow thistle in flax (Roundup only).

   Apply 1.0 L/acre of Roundup when flax has 30 per cent or less seed moisture and when 80 per cent of bolls are brown. Ensure that quackgrass has 4 to 5 green leaves and Canada thistle and sow-thistle are at or beyond bud stage for best results.

Cost:

$12.90 per L (1991 suggested retail price).

Water Volume:

Do not use 'hard' water. Use only clean water at a volume of 4.4 to 10 gallons/acre (20 to 45 L/acre). The lower water volume will improve control. If water volumes of 14 gallons/acre (65 L/acre) or higher are used, the addition of a non-ionic surfactant such as Agral 90, Agsurf or Triton XR at 0.5 L per 100 L spray solution is required.

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Best results when temperatures are in the high-teens or low 20's (degrees C) and when weeds are actively growing. Frost which kills more than 40 per cent of above ground tissue will reduce control.

Tank Mixes:

Herbicides: Minimum tillage cereals - Pardner

Chemical fallow - Banvel, Pardner, 2,4-D

Canada thistle - Banvel. Use 0.69 L/acre Roundup + 0.51 L/acre Banvel plus 0.14 L/acre Agral 90.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within six hours will reduce weed control.

Grazing: Do not graze or harvest treated areas until treated plants have turned brown.

Recropping: None

Aerial Application: Do not apply by air.

Storage: Store above -12 ° C.

Tank Cleaning:

Wash equipment thoroughly with water immediately after use.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, immediately dilute by administering water or milk to victim. Contact a physician immediately.

WEED	STAGE	RATE (L /acre)	SPOT TREATMENT TO COVER 10' x 10' PATCH	
			(mls product)	(litres water)
Quackgrass	8 inches (20 cm) tall	1.0 - 2.8	3 - 7	0.1
Canada thistle	Prebud	1.9 - 2.8	5 - 7	0.1
Field bindweed	Bloom	2.8 - 4.9	7 - 11	0.1
Milkweed	Bud to Bloom	4.9	11	0.1

Rustler

Formulation:

132 g/L glyphosate present as the isopropylamine salt.

60 g/L dicamba present as the isopropylamine salt.

Container sizes: 10 L, 115 L, 400 L.

Crops:

Summerfallow.

Weeds:

See "Summerfallow" chart in Section I for a list of weeds controlled.

Crop Stage:

Apply during fallow year.

Weed Stage:

Application should be made to emerged, actively growing weeds. Application at early growth stages generally provides the best results.

Annual grasses- Apply 1 L/acre anytime between emergence and heading. For wild oat control apply at the 1-3 leaf stage.

Annual broadleaves- Apply 1 L/acre anytime up to 15 cm height. For flixweed control apply 1.26L/acre. This treatment will only provide suppression of redroot pigweed and should be tank mixed with 0.4 L/acre of 2,4-D (500 g/L formulation) for best results.

Perennials-Apply 2.12 L/acre for suppression of foxtail barley before initiation of the seed head.

Cost:

$5.95-$7.50/acre.

Water Volume:

Apply in 20-40 L/acre water. Avoid the use of extremely hard water (greater than 700 ppm calcium or magnesium).

Pressure:

200-275 kPa (30-40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Reduced results may occur if application is made to weeds which are drought-stressed, damaged by disease or insects.

Tank Mixes:

For best control of redroot pigweed and flixweed, tank mix with 0.4 L/acre of 2,4-D (500 g/L formulation) and 20-40 L/acre water.

Restrictions:

Rainfall: Within six hours may reduce weed control. Heavy rainfall within two hours after application may require a repeat treatment.

Grazing: Do not graze or harvest treated areas.

Recropping: None.

Aerial Application: Do not apply by air.

Storage: Store above 5° C.

Equipment: Do not mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Tank Cleaning:

Clean sprayer thoroughly after application.

Flush tank with clean water and thoroughly rinse entire sprayer system. Fill tank with water and ammonia, using one litre of household ammonia per 100 litres of water. Pump enough solution through system to fill all parts. Fill tank, close and leave for 24 hours before draining and rinsing thoroughly with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles or face shield.

First Aid:

If herbicide contacts skin, rinse off immediately with water and flush with plenty of water for at least 15 minutes. If in eyes, flush with water immediately for 15 minutes. Get medical attention. If swallowed and victim is conscious, immediately dilute with milk or water. Get medical attention immediately.

Stampede CM

Formulation:

360 g/L propanil and 100 g/L MCPA ester formulated as an emulsifiable concentrate. Container size 11.36 L.

Crops:

Barley, flax, oats, wheat, canaryseed.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Cereals - 2 to 5 leaf stage. Canaryseed - 2 to 4 leaf stage. Flax - 2 to 5 inches (5 to 12.5 cm) in height.

Weed Stage:

Apply when the majority of the green foxtail plants are in the 3 leaf stage and less than 2.5 cm in height. Broadleaf weeds - 1 to 4 leaf stage.

Cost:

$10.21/acre (1991 suggested retail price).

Rates:

1.11 L/acre (one 11.36 L container treats 10.2 acres).

Water Volume:

For standard ground sprayers, use 10 gallons/acre (45 L/acre) water. When using floater type equipment, apply in 15 gallons/acre (70 L/acre) water. Ensure that water temperature is at least 10° C.

Pressure:

275 kPa (40 psi).

Nozzles:

Use conventional ground sprayer employing 50 mesh nozzle and filter screens. Use flat fan nozzles only. Application by aircraft or spray coupe is not recommended.

Effects of Weather:

Do not spray when temperatures are below 10 ° C or when daytime high temperatures will exceed 30° C as severe crop injury will occur. Do not apply if crop is recovering from frost damage or if frost is expected within 24 hours. Crops damaged by winds should be fully recovered before applying Stampede CM. Best weed control is obtained when relative humidity is high and daily maximum temperatures exceed 21° C. Poor control can be expected if top soil is dry to a depth of 2 inches (5 cm) or more.

Tank Mixes:

Herbicides - None registered. Allow a three-day interval before or after application of Stampede CM and other herbicides. Do not apply after a field has been treated with a triazine herbicide (for example, Lexone, Sencor, Blagal, Bladex, Marksman, Laddok, Simadex, or Princep) unless all of the triazine residues have disappeared.

Fertilizers - None.

Insecticides - None. Allow 14 days between application of Stampede and Dimethoate (Cygon) or Malathion insecticides. Decis may be applied at any time before or after Stampede application. Do not spray other insecticides the same season as Stampede applications.

Restrictions:

Rainfall: Within four hours will reduce control.

Grazing: Do not graze or harvest for livestock feed in year of treatment.

Recropping: No restrictions the season after Stampede CM application.

Aerial Application: Do not apply by air.

Storage: Do not store at temperatures below -9 ° C.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, administer two glasses of water and get medical help immediately.

Hazard Rating:

Warning Poison.

Warning Corrosive.

Sweep

Formulation:

250 g/L paraquat.

Container size - 10 L.

Crops:

Summerfallow.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Summerfallow.

Weed Stage:

Annual grasses: 2 - 4 leaf stage.

Cost:

$ 6.20 to 8.20/acre (1991 suggested retail price).

Rates:

0.69 to 0.91 L/acre. Use the high rate under dry conditions or if weed population is dense. (One 10 L container treats 14.5 to 11.0 acres.)

Water Volumes:

10 - 18 gallons/acre (45 to 80 L/acre). Use 15 to 18 gallons/acre (70 to 80 L/acre) if weeds are in the 4-leaf stage.

Pressure:

200 - 275 kPa (35 to 40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Best results when applied on cloudy, cool days.

Tank Mixes:

Herbicides: May be tank mixed with 2,4-D, Afolan F/Lorox + MCPA, Buctril M, Banvel + 2,4-D.

If applying tank mixes of Sweep with 2,4-D, MCPA or Banvel mixes, spray immediately or the effectiveness of the treatment will be reduced.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within two hours will reduce control.

Grazing: Do not graze treated plant material.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

When finished spraying Sweep, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and Agral 90 at 0.6 L per 1,000 L spray solution. Scrub inside surfaces of tank but do not enter tank. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Do not clean equipment upslope of water bodies or ditches, or near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes.

Sweep is fatal if swallowed. If swallowed and the victim is conscious, induce vomiting immediately if not already occurring. Get to nearest hospital fast. If delay is unavoidable, administer fluids and induce further vomiting.

Hazard Rating:

Danger Poison

Target

Formulation:

275 g/L MCPA, 62.5 g/L mecoprop and 62.5 g/L dicamba formulated as a solution.

Container size - 10 L.

Crops:

Wheat (spring and durum), barley, oats, canaryseed, winter wheat, fall stubble or on summerfallow.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Barley - 2 to 4 leaf stage.

Canaryseed, Oats, Wheat (spring and durum) - 2 to 5 leaf stage.

Winter wheat - spring application only; before the crop is more than 12 inches (30 cm) high (top leaf extended).

Weed Stage:

2 to 3 leaf stage. Hempnettle before second pair of true leaves are formed.

Cleavers in the 1 to 2 whorl stage.

Weed Resistance Note:

Wild mustard, which is resistant to a group of herbicides which includes Target, has been identified in Manitoba. These populations of wild mustard developed following use of Group 4 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$3.89 to 5.86/acre (1991 suggested retail price).

Rate:

0.405 to 0.61 L/acre. Use the higher rate under adverse weather conditions, when weed density is high or for cleavers control. (One 10 L container treats 24.7 to 16.4 acres.)

For Canada thistle, post-harvest or summerfallow application, 0.81 L/acre. (One 10L container treats 12.4 acres).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan with 50 mesh screens and filters.

Effects of Weather:

Hot and dry or cold and wet weather prior to spraying may result in reduced weed control and crop injury.

Tank Mixes:

Herbicides: Wheat - Target may be mixed with Sencor, Lorox L or Afolan for chickweed control.

Barley - Target may be mixed with Sencor, Lorox L or Afolan for chickweed control or with NaTa TCA pellets for green foxtail control.

Fertilizers - None.

Insecticides - None.

Restrictions:

Rainfall: Within three hours will reduce control.

Grazing: Do not graze or harvest for livestock feed until seven days after application.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and the victim is conscious, induce vomiting and get medical help immediately.

Hazard Rating:

Caution Poison

TCA (NaTA TCA, Bar-Fox)

Formulations:
NaTA TCA - 85 per cent TCA.
Bar-Fox - 83 per cent TCA.

Crops:
Barley, oats, canola, flax, peas.

Weeds:
See charts in Section I for a list of weeds controlled.

Crop Stage:
Cereals, canola - 2 to 4 leaf stage.
Flax - 4 to 6 inches (10 to 15 cm) tall.
Peas - 4 to 6 inches (10 to 15 cm) vine length.

Weed Stage:
1 to 2 leaf stage.

Cost:
$ 3.26 to 11.07/acre.

Rates:
Barley - 0.5 kg/acre.
Oats - 0.5 to 1.1 kg/acre.
Canola - 1.1 to 1.8 kg/acre.
Flax - 1.6 to 2.2 kg/acre.
Peas - 1.8 to 2.2 kg/acre.

Water Volume:
10 gallons/acre (45 L/acre).

Pressure:
275 kPa (40 psi).

Nozzles:
80 degree or 110 degree stainless steel flat fan nozzles with 50 mesh screens and filters.

Effects of Weather:
Requires adequate soil moisture for acceptable foxtail control.

Tank Mixes:
Herbicides: Barley - May be tank mixed with 2,4-D amine, MCPA amine, or MCPA sodium salt.

Oats and flax: May be tank mixed with MCPA amine or sodium salt.

Peas: May be tank mixed with MCPA sodium salt.

Protective Equipment:
When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:
If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting. Get medical help immediately.

Hazard Rating:
Warning Poison

Tordon 202 C

Formulation:

12 g/L of picloram + 200 g/L of 2,4-D both present as mixed alkanolamine salts.

Container size - 20 L pails.

Crops:

Barley, wheat, seedling bromegrass, seedling timothy.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Wheat and barley - 3 to 5 leaf stage.

Seedling bromegrass and timothy - 4 leaf to shot blade stage prior to August 1.

Weed Stage:

2 to 4 leaf stage.

Weed Resistance Note:

Wild mustard, which is resistant to a group of herbicides which includes Tordon 202 C, have been identified in Manitoba. These populations developed following the use of Group 4 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (Page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$3.65/acre (1991 suggested retail price).

Rate:

0.81 L/acre (one 20 L pail treats 25 acres).

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Cool, dry weather may cause reduced weed control.

Tank Mixes:

Herbicides - not recommended.

Fertilizers - not recommended.

Insecticides - not recommended.

Restrictions:

Rainfall: Within six hours of application will reduce activity.

Grazing: Do not permit meat animals being finished for slaughter nor dairy animals to forage or graze treated fields within two weeks of treatment. Do not use straw from treated crops for compost or mulching on susceptible broadleaf crops. If straw is used for bedding or animal feed, return the manure to fields to be planted to grain crops, flax or rapeseed.

Recropping: The year following treatment and the second year after treatment, plant rapeseed (canola), wheat, barley, oats, rye, mustard, winter wheat, or summerfallow.

The third year after treatment plant any of the above, or alfalfa or sunflowers. The fifth year after treatment, plant any of the above, beans, peas, lentils, potatoes, fababeans. Due to the length of the recropping restrictions, use of Tordon 202 C is not recommended on farms where vegetable crops, pulse crops, or forage legumes are included in the crop rotation.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

Even after thorough cleaning, a sprayer which has come in contact with Tordon 202 C may cause damage when used on susceptible crops. It is advisable to use sprayers which have been used to apply Tordon 202 C on wheat and barley only.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls

chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brir .med hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Hazard Rating:

Caution Poison

Trifluralin (Green and Yellow Foxtail Control in Cereals)

Formulations:

Advance 10G - trifluralin formulated as a 10 per cent granular in 22.7 kg bags.

Rival - trifluralin formulated as a 500 g/L emulsifiable concentrate in 9 L containers.

Rival 10G - trifluralin formulated as a 10 per cent granular in 22.7 kg bags.

Treflan EC - trifluralin formulated as a 545 g/L emulsifiable concentrate in 8.3 L containers.

Treflan QR5 - trifluralin formulated as a 5 per cent granular in 25 kg bags.

Trifluralin 400 - trifluralin formulated as a 400 g/L emulsifiable concentrate in 10 L containers.

Triflurex EC - trifluralin formulated as a 450 g/L emulsifiable concentrate in 22.7 L containers.

Crops:

Liquids applied in spring (green and yellow foxtail control only) - spring wheat, barley. Granulars applied in fall (green and yellow foxtail control only) - spring wheat.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Liquid formulations - spring applications only. After seeding but prior to crop emergence.

Granular formulations - fall applications only. After September 1 but before freeze-up.

Weed Stage:

Preemergence.

Weed Resistance Note:

Green foxtail which is resistant to trifluralin products and to Edge has been identified in Manitoba. These populations of green foxtail developed following use of Group 3 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

Liquids - $ 4.96 - 6.69/acre.

Granulars - $ 5.51/acre (1991 suggested retail price).

Water Volume:

10 gallons/acre (45 L/acre) - liquid formulations only.

Pressure:

275 kPa (40 psi) - liquid formulations only.

Nozzles:

Flat fan - liquid formulations only.

Rates:

LIQUIDS

PRODUCT	RATES (L /acre)	
	LIGHT AND MEDIUM SOIL TEXTURE	HEAVY SOIL TEXTURE
Rival	0.49	0.65
Treflan EC	0.45	0.61
Trifluralin 400	0.57	0.85
Triflurex 400 EC	0.57	0.85

GRANULARS

PRODUCT	RATES (kg/acre)
	All soils 2 - 8% organic matter
Advance 10G/Rival 10G	2.23
Treflan QR5	4.45

Incorporation:

Liquid formulations - Apply and incorporate in the spring just after seeding. Incorporate to a shallow depth into a trash-free soil (80 per cent black when viewed from above) using diamond or tyne type harrows operated at a speed of 8 km/h (5 mph). Incorporate twice, with the second incorporation at right angles to the first. The first incorporation should be performed immediately. Both incorporations should be done within 24 hours of application. When tank mixing Rival or Treflan with Avadex BW, follow the same incorporation procedure as outlined above.

Granular formulations - Incorporate with cultivators or disk implements only. Perform the first tillage operation within 24 hours of application. Incorporate at a working speed of 8 to 13 km/hr (5 to 8 mph) and to a depth of 2 to 3 inches (5 to 8 cm). Wait a minimum of five days, then incorporate a second time at right angles to the first. This second incorporation may be delayed until the following spring. Subsequent working should be no deeper than 2 to 3 inches (5 to 8 cm).

Effects of Weather:

If using fall applications of the granular formulations, crop injury will occur if soil conditions are not conducive to rapid wheat emergence (i.e., cold or dry soil conditions). Weed control is best when soil moisture conditions are good.

Tank Mixes:

Herbicides: May be tank mixed with Avadex BW.

Fertilizer: Liquid trifluralin may be applied with liquid fertilizer (eg. 28-0-0) as a carrier. Conduct a compatability test before mixing.

Insecticides: None.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze or harvest treated crop for livestock feed.

Recropping: Do not sow sugar beets, canaryseed or small seeded forage grasses one year after spring applications, or 21 months after fall applications.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately. Do not induce vomiting.

Trifluralin (Broadleaf and Grassy Weed Control)

Formulations:

Advance - trifluralin formulated as a 10 per cent granular in 22.7 kg bags.

Rival EC - trifluralin formulated as a 500 g/L emulsifiable concentrate in 9L containers.

Rival 10G - trifluralin formulated as a 10 per cent granular in 22.7 kg bags.

Treflan - trifluralin formulated as a 545 g/L emulsifiable concentrate in 8.3 L containers.

Treflan QR5 - trifluralin formulated as a 5 per cent granular in 25 kg bags.

Trifluralin 10G - trifluralin formulated as a 10 per cent granular in 22.7 kg bags.

Triflurex - trifluralin formulated as a 400 g/L emulsifiable concentrate in 22.7 L containers.

Crops:

Spring-applied liquid or granular formulations - canola, peas, sunflowers, dry beans, mustard, fababeans, alfalfa, sweet clover, soybeans.

Fall-applied granular formulations - canola, peas, sunflowers, dry beans, mustard, fababeans, soybeans, barley, lentils and flax.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Preplant incorporated.

Weed Stage:

Preemergence.

Weed Resistance Note:

Green foxtail, which is resistant to trifluralin products and to Edge, has been identified in Manitoba. These populations of green foxtail developed following use of Group 3 herbicides year after year on the same field. See 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Costs:

Liquids - $ 6.70 - 12.06/acre.

Granulars $ 8.53 - 17.10/acre (1991 suggested retail price).

Water Volume:

10 gallons/acre (45 L/acre) (liquid products only).

Pressure:

275 kPa (40 psi) (liquid products only).

Nozzles:

Flat fan (liquid products only).

Incorporation:

Granular formulations are recommended for use in fall or spring as a preplant incorporated treatment on labelled broadleaf crops. The liquid formulations should be used only on soils free of lumps and relatively trash-free (75 per cent black) and are recommended only for spring use. Do not use liquid formulations of trifluralin as a preplant incorporated treatment in barley, as severe injury will result. Only the fall applications of Advance 10G, Rival 10G or Treflan QR5 are registered for use as preplant incorporated treatments in barley.

For fall application of granular formulations, work the chemical into the soil between September 1 and freeze-up. Use a discer or field cultivator (vibrating shank-type). Disc implements are preferred on stubble. Set equipment to cut at 3 to 4 inches (8 to 10 cm) depth for the first incorporation. The initial incorporation should be done within 24 hours of application. The second incorporation should be done at right angles to the first.

The second incorporation may be delayed until spring, except when planting barley, flax or lentils; for these crops both incorporations must be done in fall. Delay the second incorporation five days for better weed control. This will allow greater release of the chemical onto soil particles and assure more even distribution. Fall application of granular trifluralin on flax, lentils or barley is not recommended on soils prone to erosion, as the two fall incorporations necessary in these crops may leave soils vulnerable to wind or water erosion.

For spring application and incorporation, work the chemical into the soil prior to seeding by setting the implement at 3 to 4 inches (8 to 10 cm) cutting depth. The first incorporation must be done within 24 hours of application. The second incorporation must be done at right angles to the first. If incorporating granular trifluralin, delay the second incorporation for three days after the first to achieve better weed control.

Effects of Weather:

Injury to flax, barley or lentils may occur if soil and weather conditions are not conducive to rapid crop emergence (cold or dry soils at the time of seeding and crop emergence).

To minimize crop injury, seed into a firm, moist seed bed. Use a press drill or hoe-drill. Sow barley no deeper than 2 inches (5 cm). Sow lentils and flax at 1.5 inches (4 cm).

Less than acceptable weed control will result if dry conditions prevail at the time of weed emergence.

Tank Mixes:

Herbicides: Triazine-tolerant canola - trifluralin liquid may be tank mixed with Sencor 500 or 75 WP. Add Sencor to the tank first, then add trifluralin as filling continues.

Fababeans - trifluralin may be tank mixed with Lexone DF, Lexone L, Sencor 75 DF or Sencor 500.

Soybeans - Treflan EC can be tank mixed with Sencor 500 (use only on KG 20 or McCall). This mixture may cause injury to soybeans if seedlings are weak or are slow to emerge.

Fertilizers: Liquid product may be applied with liquid fertilizer as a carrier. Before the herbicide is added to the tank, compatibility of the herbicide to liquid fertilizer should be tested following instructions on the herbicide container. May be blended with dry bulk fertilizers. (Do not mix with ammonium nitrate.) Check label for blending instructions.

Insecticides: None registered.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze or harvest as feed prior to crop maturity.

Recropping: Sugar beets, red beets, oats, canaryseed, small-seeded grasses may be affected the year after treatment. Corn is sensitive at higher rates of application. Damage to wheat can occur if the crop is seeded into land which has been treated during the previous 21 months with trifluralin products and which has received abnormally low amounts of precipitation. Damage is worse if conditions are not conducive to rapid emergence of the wheat (i.e., if the crop is seeded deep or if soil conditions remain cool during emergence). Damage tends to be greater on fields treated with granular formulations.

Aerial Application: Do not apply by air.

Storage: Do not freeze liquid formulations.

Granular formulations must be stored in a cool, dry location, out of sunlight.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Rates:

For use in canola, peas, sunflowers, dry beans, mustard, fababeans, seedling alfalfa (spring only), seedling sweet clover (spring only), soybeans. Apply:

PRODUCT	SOIL TYPE			
	Lights soils with less than 6% matter organic		Medium to heavy soils with 6 - 15% organic matter	
	Spring	Fall	Spring	Fall
Advance	Not recommended	4.45 kg/acre	Not recommended	5.7 - 6.9 kg/acre
Rival	0.65 L/acre	*	0.91 - 1.1 L/acre	*
Rival 10G	3.4 kg/acre	4.45 kg/acre	4.45 - 5.7 kg/acre	5.7 - 6.9 kg/acre
Treflan EC	0.61 L/acre	*	0.81 - 1.1 L/acre	*
Treflan QR5	6.9 kg/acre	8.9 kg/acre	8.9 - 11.3 kg/acre	11.3 - 13.8 kg/acre
Trifluralin 10G	3.4 kg/acre	4.45 kg/acre	4.45 - 5.7 kg/acre	5.7 - 6.9 kg/acre
Triflurex	0.81 L/acre	*	1.1 L/acre	*

* Although liquid formulations are registered for fall application, this use is not recommended as incorporation requirements will predispose fields to erosion.

For use in barley (fall only), apply:

PRODUCT	SOIL TEXTURE		
	Medium to heavy textured soils (2-4% organic matter)	**Medium to heavy textured soils (4-6% organic matter)**	**Heavy textured soils (6-10% organic matter)**
Advance 10G Rival 10G Trifluralin 10G	3.44 kg/acre	4.45 kg/acre	5.67 kg/acre
Treflan QR5	8.9 kg/acre	11.3 kg/acre	Not recommended

For use in fall in flax or lentils, apply:

PRODUCT	SOIL TEXTURE	
	Light soils with less than 6% organic matter	**Medium to heavy soils with 6-15% organic matter**
Advance 10G	4.45 kg/acre	5.7 - 6.9 kg/acre
Rival 10G	4.45 kg/acre	5.7 - 6.9 kg/acre
Trifluralin 10G	4.45 kg/acre	5.7 - 6.9 kg/acre
Treflan QR5	8.9 kg/acre	11.3 - 13.8 kg/acre

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting, then administer at least 10 ounces (0.3 L) of water (children), 30 ounces (0.8 L) of water (adults). Get medical help immediately.

Triumph Plus

Formulation:

The Triumph Plus package contains two containers, one labelled 'Greenfox' and one 'DF'. Greenfox, containing 28 g/L fenoxaprop and 336 g/L MCPA ester. Container size - 10.1 L.

DF contains 75 per cent thifensulfuron. Container size - 162 grams.

Crop:

Spring wheat (except durum).

Weeds:

See chart in Section I for a list of weeds controlled.

Crop Stage:

2 leaf through tillering. Do not apply within 80 days of harvest.

Weed Stage:

Annual grass weeds - 1 to 6 leaf.

Broadleaf weeds - 2 to 4 leaf stage or less than 4 inches (10 cm).

Chickweed - 1 to 6 leaf stage.

Wild buckwheat - 1 to 3 leaf stage.

Weed Resistance Note:

Wild oats and green foxtail, which are resistant to Triumph Plus, have been identified in Manitoba. These populations of wild oats and green foxtail developed following use of Group 1 herbicides year after year on the same field. See, 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$16.95/acre (1991 suggested retail price).

Rates:

The manufacturers of Triumph Plus indicates that more than one formulation of this product may be available in 1992. Check the label on the container for information on rates.

Water Volume:

10 gallons/acre (45 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

80 degree or 110 degree stainless steel flat fan tilted forward at a 45 degree angle. Screens 50 mesh or larger.

Effects of Weather:

Do not apply to crop that is stressed by severe weather (if daytime temperatures exceed 28 ° C or fall below 12 ° C, low humidity, frost, low fertility, drought, water-saturated soil, disease or insect damage) as crop injury and poor weed control may result. Crop yellowing and stunting will occur if hot humid conditions prevail during spraying.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Do not tank mix with any other chemical additive, pesticides, or fertilizers. Do not use a surfactant with this tank mix.

Restrictions:

Rainfall: Do not apply if rain is expected within two hours after spraying.

Grazing: Do not graze treated fields prior to harvest.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze. If stored for one year or longer, shake well before using.

Tank Cleaning:

When finished spraying Triumph Plus, run clean water through the tank, pump and lines. Drain and refill with clean water and 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves.
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately. Do not induce vomiting.

Hazard Rating:

Warning Poison

Tropotox Plus

Formulation:

375 g/L MCPB, 25 g/L MCPA formulated as a solution.

Container size - 8 L.

Crops:

Peas, alsike clover, red clover or white Dutch clover sown alone or with a barley, wheat or oat companion crop.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Peas - when the plants have 3 to 6 nodes.

Clover - apply between the 1 to 3 trifoliolate leaf stage.

Oats, wheat or barley companion crop - between 2 leaf and shot blade stage.

Weed Stage:

2 to 4 leaf stage.

Weed Resistance Note:

Wild mustard, which is resistant to Tropotox Plus, has been identified in Manitoba. These populations of wild mustard developed following use of Group 4 herbicides year after year on the same field. See, 'Resistance of Weeds to Herbicides' (page 12) for information on minimizing the risk of developing weed resistance.

Cost:

$9.00/acre to $13.90/acre (1991 suggested retail price).

Rate:

1.11 L/acre (one 8 L container treats 7.2 acres.) For heavy weed infestations, for suppression of Canada thistle, or if cool, dry conditions prevail, apply 1.72 L/acre. (One 8 L jug treats 4.7 acres.)

Water Volume:

15 to 20 gallons/acre (70 to 90 L/acre).

Pressure:

275 kPa (40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Damage to peas or seedling forage legumes may occur if the crop is sprayed when under drought or disease stress. Under extremely hot or humid conditions, crop injury may be severe. Best activity on weeds occurs in warm weather.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within four hours of application will reduce control.

Grazing: Do not graze or harvest for livestock feed in year of treatment.

Recropping: None listed. Phenoxy herbicides can persist in soils for weeks, particularly if dry or cool weather persists. Do not seed sensitive crops immediately after spraying.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, and if victim is conscious, give plenty of water. If victim is unconscious, do not give anything by mouth. Get medical help immediately.

Hazard Rating:

Caution Poison

Velpar L

Formulation:

240 g/L hexazinone.

Crops:

Alfalfa for seed.

Weeds:

See charts in Section I for a list of weeds controlled.

Crop Stage:

Apply in late fall prior to freeze-up when alfalfa is dormant, or in early spring before alfalfa growth resumes. Apply only on alfalfa which has been established for 18 months or longer. If burning is to be carried out, do not apply until this operation has been completed.

Weed Stage:

Dormant (after growth has ceased in fall or prior to growth resuming in spring).

Cost:

$16.62 - 33.74/acre (1991 suggested retail price).

Rates:

0.85 to 1.7 L/acre. Use the lower rate on light-textured soils with low organic matter.

Water Volume:

20 gallons/acre (90 L/acre).

Pressure:

200 to 275 kPa (30 to 40 psi).

Nozzles:

Flat fan.

Effects of Weather:

Adequate soil moisture is required for activation of the product.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Rainfall is beneficial for activation of the product.

Grazing: Do not graze or harvest for livestock feed within 16 months of treatment.

Recropping: Insufficient information is available. Velpar residues will persist for two or more years after application.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

The manufacturer does not provide enough information on tank cleaning to make recommendations.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your

sprayer away from areas that family members or others are likely to frequent or walk through.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots and gloves
(unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If herbicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

Special Weed Problems

This section identifies specific weeds and some herbicides recommended for control. Refer to the particular crop section or the product label for information on specific products which may be used on the crops and application instructions.

Absinthe:

2,4-D LV Ester (500g/L) - In grass pastures with no legumes, spray 1.82 L/acre in late June, prior to flowering. Re-treat regrowth in late summer when plants have 6 to 10 inches (15 to 25 cm) of new growth. More than one season of treatment may be required.

Baby's Breath (perennial)

Banvel (480 g/L) - In grass pastures with no legumes, apply 3.72 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water when actively growing.

Curled Dock

Banvel (480 g/L) - As a patch treatment, apply 0.92 L/acre Banvel in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

Laredo (356 g/L), Roundup (356 g/L), Wrangler (356 g/L) As a spot treatment in labelled crops, apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment. Heavy rainfall within two hours after application may wash chemical off the foliage and a repeat treatment may be required. Rainfall occurring within six hours after application may reduce effectiveness.

MCPA amine, 2,4-D amine - In labelled crops, apply 0.445 to 0.69 L/acre of formulations containing 500 g/L MCPA or 2,4-D amine to give top growth control.

Field Bindweed

Banvel (480 g/L) - As a patch treatment, apply 1.0 L/acre Banvel in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply when field bindweed is in the flowering stage and allow three weeks after treatment before resuming normal summerfallow tillage.

Basagran (480 g/L) - In labelled crops, apply 0.71 L/acre followed by 0.71 L/acre seven to 10 days later. Apply in 20 to 35 gallons/acre (90 to 160 L/acre) water before field bindweed has developed a dark green colour and before it has begun trailing. Use a recommended surfactant (see recommendations under the appropriate crop).

Embutox 625 (625 g/L), Cobutox (400 g/L), 2,4-D Butyric 400 (400 g/L) - As a spot treatment in labelled crops apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water at the bud stage. Do not disturb plants for at least 10 days following treatment. Heavy rainfall within two hours of application may wash chemical off the foliage and a repeat treatment may be required. Rainfall occurring within six hours after application may reduce control.

2,4-D amine - In grass pastures containing no legumes or as a spot treatment, apply 1.82 L/acre of formulations containing 500 g/L 2,4-D amine at early flowering stage.

Goat's-beard

2,4-D amine - Apply 0.91 L/acre of formulations containing 500 g/L in early fall or early spring.

Field Horsetail

MCPA amine, potassium and sodium salt mixtures - Apply 0.57 L/acre of formulations containing 500 g/L MCPA after the weeds have fully emerged for top growth control. May be used in wheat, oats, barley, flax and rye.

Foxtail Barley

Gramoxone (200 g/L) - Apply 2.23 L/acre in 98 gallons/acre (445 L/acre) water or 75 ml in 2.2 gallons (10 L) water/1076 square feet (100 square metres) for top growth control only.

Kerb 50-W (50%) - Apply 0.364 to 0.445 kg/acre product in 20 gallons/acre (90 L/acre) water between October 1 and freeze-up. Use the lower rate on grey-wooded soils or where perennial bluegrass or fescues are the predominant pasture species. Do not use Kerb for foxtail barley removal in seed grass stands or desired foliage stands of timothy or fescue grass species. At recommended rates, pasture stands of perennial bluegrass and fescue may be reduced by 10 to 15 per cent. Where perennial bluegrass and fescues are the dominant pasture species, use the lower rate of Kerb. Spray overlaps may seriously harm desirable pasture grass species. Where foxtail barley comprises most of the grass stand and reseeding to a desirable grass species is required, delay seeding into the Kerb-treated soil until the end of June. Do not harvest or graze within 60 days after application with Kerb. Avoid using Kerb on soils having more than six per cent organic matter.

Hemp Dogbane

Laredo (356 g/L), Roundup (356 g/L), Wrangler (356 g/L) Apply 2.83 to 4.86 L/acre when hemp dogbane is in the early bud stage. Apply in 10 gallons/acre (45 L/acre) water. Do not disturb treated plants for at least seven days after application. Heavy rainfall within two hours after application may wash chemical off the foliage and a repeat treatment may be required. Rainfall occurring within six hours after application may reduce control.

2,4-D amine or LV ester - Apply 1.38 to 1.82 L/acre of formulations containing 500 g/L 2,4-D in fall before frost and while plant leaves are green.

Leafy Spurge

Banvel (480 g/L) - Apply 0.84 L/acre Banvel in 10 to 20 gallons/acre (45 to 90 L/acre) water for top growth control when the weed is actively growing.

2,4-D amine - Apply 1.82 L/acre of formulations containing 500 g/L 2,4-D at early flowering stage. Repeat at least once to new growth later in the season. Control of established plants and new seedlings will require continued applications for a period of at least four to five years.

Milkweed

Laredo (356 g/L), Roundup (356 g/L), Wrangler (356 g/L) Apply 4.86 L/acre in 10 gallons/acre (45 L/acre) water or 125 ml in 6.5 L water/1,076 square feet (100 square metres). Apply when most plants have reached the bud to bloom stage. Reduced results may occur on plants treated after full bloom as not all milkweed plants reach the required stage of growth at the same time. Repeat treatments may be required. Do not disturb plants for 10 days following treatment. Do not apply to plants covered with dirt. Heavy rainfall within two hours after application may wash chemical off the foliage and a repeat treatment may be required. Rainfall occurring within six hours after application may reduce control.

Perennial Smartweed

Laredo (356 g/L), Roundup (356 g/L), Wrangler (356 g/L) Apply 2.0 L/acre in 10 gallons/acre. Apply when vines are a minimum of 8 inches (20 cm) tall, but before flowering.

Poverty Weed

Banvel (480 g/L) - As a spot treatment apply 1.86 L/acre Banvel in 10 to 20 gallons/acre (45 to 90 L/acre) water when weed is actively growing. Banvel at 0.61 L/acre will provide only top growth control.

Red Bartsia

2,4-D amine or LV ester - Apply 0.57 L/acre of formulations containing 500 g/L 2,4-D in 10 gallons/acre (45 L/acre) water. On hayland, treat within 10 days after first cutting. Roadsides and pastures should be sprayed as soon as the red bartsia appears, usually in early July. Repeat treatment if necessary for later germination.

Scentless Chamomile

Banvel (480 g/L) - Apply 0.51 L/acre Banvel in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

Buctril M - Apply 0.405 L/acre Buctril M when scentless chamomile is in the 2 to 4 leaf stage.

Round leaved Mallow

2,4-D - In cereals apply 0.69 L/acre of 2,4-D (500 g/L formulations) when weeds are in the 2 to 4 leaf stage and when the crop is in the 4 leaf to flag leaf stage.

Estaprop 582 g/L- In cereals, apply 0.71 L/acre when weeds are in the 2 to 4 leaf stage and when the crop is in the 4 leaf to flag leaf stage.

Stinging Nettle

2,4-D amine - Apply 0.91 to 1.82 L/acre of formulations containing 500 g/L 2,4-D amine.

Toadflax

Estaprop (582 g/L) - Apply 0.71 L/acre in 10 to 18 gallons/acre (45 to 80 L/acre) water in wheat or barley for toadflax suppression. Apply when majority of toadflax is no taller than 6 inches (15 cm). The use of Estaprop for suppression of toadflax in wheat or barley should be part of a long-term planned approach for toadflax control, which includes spring and fall tillage, fall patch spraying, summerfallow or chemical fallow.

Laredo (356 g/L), Roundup (356 g/L), Wrangler (356 g/L) Apply 2.83 to 4.86 L/acre when most plants have reached the early bud stage of growth. Allow seven more days after application before tillage.

Western Snowberry (buckbrush), Wolf Willow

Banvel (480 g/L) plus 2,4-D amine or LV ester - Apply 0.84 L/acre Banvel tank mixed with 1.82 L/acre of formulations containing 500 g/L 2,4-D, in 89 gallons/acre (405 L/acre) water.

2,4-D - Apply 1.82 L/acre of formulations containing 500 g/L 2,4-D in not less than 20 gallons/acre (90 L/acre) water with ground equipment.

2,4-D LV Ester - Apply 1.82 L/acre of formulations containing 500 g/L 2,4-D in 3.2 to 6 gallons/acre (15 to 27 L/acre) diesel oil for application by aircraft. Treat at full leaf stage. Apply between June 15 to July 15 before abscission layer is formed. Good spray coverage is essential. Retreatment may be necessary the following year.

Table 21. Foliar applied Fungicides in Field Crops

	Wheat (Durum)	Wheat (Hard red spring)	Wheat (Prairie Spring)*	Wheat (Winter)	Barley	Beans (Field)	Canola	Potatoes	Sugar Beets	Bacterial Blight (Beans)	Cercospora Leaf Spot	Early or Late Blight	Gray Mold (Botrytis) (Beans)	Leaf Rust	Spot Blotch, Net Blotch, Scald	Powdery Mildew	Sclerotinia	Septoria (Wheat)	Septoria (Barley)	Stem Rust (Wheat)	Tan Spot
Bayleton				X										●		●				●	
Benlate						X	X						●				●				
Botran						X							●				●				
Bravo-W75, Bravo 500								X				●									
Copper Oxychloride 50, Clean Crop Copper Spray, Clean Crop Copper 50								X				●									
Dithane DG, Manzate 200 DF								X				●									
Dithane M-22								X				●									
Dithane M-45	X	X	X	X				X	X		●	●		●				●			●
Easout						X											●				
Kocide 101						X			X	●	●										
Manzate 200								X	X		●	●									
Manzate-D								X	X		●	●									
Mertect									X		●										
Polyram 7D								X				●									
Polyram 80, Polyram DF								X	X		●	●									
Rovral Flo							X										●				
Tilt			X	X	X									●	●	●		●	●	●	●
Zineb								X				●									

*includes semi-dwarf varieties

Table 22. Seed Treatments in Field Crops

FUNGICIDES	CROP AND DISEASES: POTATO SEED PIECE: Blackleg	Black Scurf (Rhizoctonia)	Common Scab	Damping Off	Seed Piece Decay	Storage Rot	Verticillium Wilt	SEED AND SEEDLING ROTS/BLIGHTS: Canola (Rapeseed)	Cereals	Corn	Field Beans	Flax	Grasses	Mustard	Peas	Rye	Soybeans	Sugarbeets	Triticale	SMUTS CARRIED ON SEED: Barley - Covered	Barley - False Loose	Corn - Head Smut	Oats - Smut	Rye - Bunt	Rye - Stem Smut	Wheat - Bunt	IN SEED: Barley - Loose Smut	Wheat - Loose Smut	BLACK LEG: Canola (Rapeseed)
Agrox D-L Plus										•	•				•		•												
Anchor									•			•				•	•		•	•	•		•		•	•	•	•	
Benolin-R								•																					•
Dithane M-22																		•											
Dithane M-45 Seed Protectant									•	•		•								•	•		•			•			
Easout	•				•		•																						
Manzate 200, Tuberseal					•																								
Manzate-D									•			•				•		•		•	•		•	•		•			
Mertect						•																							
N-M Drill Box									•			•				•				•	•		•	•		•			
N-M Dual Purpose									•											•	•		•	•		•			
Polyram 7D, Polyram-Diazinon	•		•		•																								
Potato Seed Piece Treatment+	•	•	•	•	•		•																						
Premiere Flowable								•						•															•
Rovral ST								•																					•
Thiram 75WP										•	•		•	•	•		•	•											
Vitaflo 280									•	•	•	•				•	•		•	•	•	•	•		•	•	•	•	
Vitavax Dual Powder Vitavax Dual Solution									•			•				•				•	•		•		•	•	•	•	
Vitavax Powder											•	•				•				•	•		•		•	•	•	•	
Vitavax Single Solution									•			•				•				•	•		•		•	•	•	•	
Vitavax RS Flowable								•						•															•
Vitavax RS Powder, Cloak								•						•															•

Agrox D-L Plus

Formulation:

Contains 15 per cent captan plus 15 per cent diazinon* plus 25 per cent lindane*.

Container size 200 g.

* Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Corn, beans, soybeans, peas.

Diseases Controlled:

Seedling blight and seed rot.

Crop Stage:

Seed treatment.

Cost:

$8.00 for 200 g. Cost to treat 22.7 kg - $2.00 (1991 suggested retail price).

Rate:

0.05 kg per 22.7 kg (one 0.2 kg container treats 90.8 kg).

Water Volume:

Not applicable.

Registered Mixes:

Use only on seed previously treated with captan or thiram. Do not use on seed already treated with an insecticide (other than methoxychlor or malathion).

Restrictions:

Feeding: Do not use treated seed for feed, food or oil processing.

Storage: Store in a cool, dry place.

Protective Equipment:

When handling product or treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. Get medical attention. If swallowed and victim is conscious, administer one or two glasses of water and induce vomiting. Continue until vomit is clear. Patient should be lying down with head below level of the feet. Do not induce vomiting if patient is unconscious or convulsing. Get medical attention.

Hazard Rating:

Warning Poison

Bayleton

Formulation:

50 per cent triadimefon formulated as a wettable powder.

Container size: 1 kg in 4 x 250 g PVA water soluble packets.

Crops:

Winter wheat.

Diseases Controlled:

Powdery mildew, rusts (leaf, stem & stripe).

Crop Stage:

Apply when disease symptoms appear. Additional applications should be made if new disease symptoms appear, up to a total of 0.445 kg/acre per crop season.

Cost:

$175/kg ($19.50 to 38.54/acre) (1991 suggested retail price).

Rate:

0.1 to 0.225 kg/acre (one container treats 10 to 4.4 acres).

Water Volumes:

10 to 30 gallons/acre (40-120 L/acre). Use higher volume where crop foliage is dense.

Tank Mixes:

Do not attempt to use PVA packets in diesel oils or summer spray oils as in ULV or LV uses. PVA packets are not oil soluble.

Do not mix packets with products that contain boron or release-free chlorine. Resulting reaction is an insoluble plastic.

Restrictions:

Grazing: Do not feed forage to livestock.

Preharvest: Do not apply within 50 days of harvest.

Storage: Keep in cool, dry place. Do not freeze.

Protective Equipment:

When handling product or treated seed wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. Get medical attention. If swallowed and victim is conscious, give water freely and induce vomiting with one dose (15 ml) of syrup of ipecac. Repeat dose if vomiting does not occur within 10 - 20 minutes. If syrup of ipecac is not available, induce vomiting by sticking finger down throat. Repeat until vomit fluid is clear. Have patient lie with head below foot level. Get medical attention.

Comments:

Do not handle packets excessively. Do not expose to moisture or handle with wet hands since breakage may result.

Do not apply by air.

Hazard Rating:

Warning Poison

Benlate

Formulation:

50 per cent benomyl formulated as a wettable powder.

Container size 2 kg, 8 kg bags, 22.7 kg drum.

Crops:

Canola, field beans.

Diseases Controlled:

Sclerotinia in canola.

Sclerotinia and botrytis in field beans.

Crop Stage:

Beans - between the stage when 50 per cent of all plants have one open flower and full bloom.

Canola - between 10 to 30 per cent bloom - usually four to seven days after first blossom appears in field.

Cost:

$17 to $26/acre canola.

$30 to $38/acre beans (1991 suggested retail price).

Rate:

Beans - 0.71 to 0.91 kg/acre (one 8 kg container treats 11.3 to 9 acres).

Canola - 0.405 to 0.61 kg/acre (one 8 kg container treats 20 to 13 acres.

Water Volume:

Beans: ground - 10 to 20 gallons/acre (40 to 80 L/acre).

Air - 3 gallons/acre (16 L/acre).

Canola: ground - 5 to 10 gallons/acre (23 to 40 L/acre).

Air - 3 gallons/acre (16 L/acre).

Nozzles:

Hollow cone or disc cone for ground and properly calibrated aerial equipment.

Effects of Weather:

Do not apply when rain is imminent. Do not irrigate within six hours of application.

Tank Mixes:

Do not mix with alkaline pesticides such as basic copper sulphate. Do not tank mix or alternate with thiophanate products (Easout).

Restrictions:

Grazing: Do not feed treated bean hay to livestock.

Preharvest Interval: 14 days.

Storage: Do not allow product to become wet during storage. Keep away from fires or sparks.

Protective Equipment:

When handling product or treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. Get medical attention.

Benolin-R

Formulation:

Contains 6 per cent benomyl, 10 per cent thiram and 50 per cent lindane* formulated as dust.

Container size 1.5 kg.

* Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Canola (rapeseed).

Diseases Controlled:

Protection during germination and early growth from:

blackleg
seed decay
seedling blight
damping off.

Crop Stage:

Seed treatment only.

Rates:

0.8 kg per 25 kg of seed (one 1.5 kg package treats 47 kg seed).

Tank Mixes:

None.

Restrictions:

Feeding: Do not use treated seed as food or feed. Do not sell to oil mills.

Storage: Store in a cool dry place. Keep away from flame or sparks.

Recropping:

Do not use on soil in which edible root crops (except rutabagas and turnips) are to be planted during the same or following season.

Protective Equipment:

When handling product or treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with plenty of water for 15 minutes. If swallowed and victim is conscious, induce vomiting with mustard or salt and warm water. Avoid liquid petrolatum and castor oil. Get medical attention.

Comments:

Do not consume alcohol within 24 hours before or after handling products or seed treated with product containing thiram.

Hazard Ratings:

Danger Poison

Botran

Formulation:

75 per cent dichloran formulated as wettable powder.
Container size 2 kg.

Crops:

Dry beans.

Diseases Controlled:

Sclerotinia (white mould).
Botrytis (grey mould).

Crop Stage:

Begin applications when disease is anticipated usually as close to full bloom as possible. Repeat applications may be necessary if conditions favouring disease persist. Direct spray to obtain good coverage particularly to lower half of plant.

Cost:

$33.50/acre (1991 suggested retail price).

Rate:

1.3 kg/acre (one 2 kg container treats 1.5 acres).

Water Volume:

70 gallons/acre (320 L/acre).

Tank Mixes:

Compatible with wettable powder formulations captan, zineb, Guthion, parathion, carbaryl and thiodan. Botran can normally be mixed with other fungicides, insecticides or defoliants formulated as wettable powders. Combination sprays of Botran and miscible oil formulations of insecticides particularly organic phosphorus compounds may cause plant injury.

Restrictions:

Preharvest: Do not apply within two days of harvest.
Grazing: Do not feed treated foliage to livestock.
Recropping: None.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. Get medical attention.

If in eyes, flush with water immediately for 15 minutes. Get medical attention.

Hazard Rating:

Caution Poison

Bravo W-75, Bravo 500

Formulation:

Bravo W-75 - 75 per cent chlorothalonil formulated as wettable powder.

Bravo 500 - 500 g/L chlorothalonil formulated as suspension.

Container size 10L.

Crops:

Potatoes.

Diseases Controlled:

Late blight and early blight.

Crop Stage:

Begin application when plants are 6 to 8 inches (15-20 cm) high or when disease threatens. Repeat applications at seven to 10 day intervals or as necessary to maintain disease control.

Cost:

$5.25 - $10.50/acre (1991 suggested retail price).

Rate:

Late Blight: 0.32-0.68 kg/acre Bravo W-75
0.48-0.97 L/acre Bravo 500

Early Blight: 0.44-0.68 kg/acre Bravo W-75
0.65-0.97 L/acre Bravo 500

Water Volume:

Volume will vary with amount of plant growth. Use sufficient water to obtain adequate spray coverage. Spray volume will usually range from 90-640 litres per acre for dilute sprays and 20-40 litres per acre for concentrate sprays.

Tank Mixes:

Do not combine with pesticides, surfactants or fertilizers unless your prior use has shown the combination physically compatible and non-injurious under your conditions of use.

Restrictions:

Grazing: Do not graze treated areas. Do not feed clippings to livestock.

Preharvest: One day preharvest interval.

Recropping: None.

Storage: Store in a cool, dry, ventilated place. Protect from excessive heat.

Protective Equipment:

When handling product, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, get medical help immediately.

This product may produce temporary allergic side-effects characterized by redness of eyes, bronchial irritation and redness or rash on exposed skin areas. If a reaction occurs contact a doctor.

Comments:

Do not apply if weather conditions favour drift from area being treated.

Clean Crop Copper 50W, Clean Crop Copper Spray, Kocide 101, Copper Oxychloride 50

Formulation:

Clean Crop Copper 50 W - 53 per cent tribasic copper sulphate formulated as a wettable powder.

Container size 2 kg.

Clean Crop Copper Spray WP Fungicide - 50 per cent copper oxychloride formulated as a wettable powder.

Container size 2 kg.

Copper Oxychloride 50 - 50 per cent copper oxychloride formulated as a wettable powder.

Container size 25 kg.

Kocide 101 - 50 per cent metallic copper equivalent formulated as a wettable powder.

Container size 5 kg.

Crops:

Potato, sugarbeet, bean.

Diseases Controlled:

	POTATO	SUGARBEET	BEAN
Clean Crop Copper 50W	Early and late blight		
Clean Crop Copper Spray	Early and late blight		
Copper oxychloride 50	Early and late blight		
Kocide 101		Cercospora leaf spot	Bacterial blight (bacterial and halo)

Crop Stage:

Potatoes: First application when plants are 10-20 cm tall. Repeat at seven to 10 day intervals.

Sugarbeets: First application when disease threatens, continue with three to four applications every 10 to 14 days.

Beans: First application when plants are 15 cm tall, as a protectant. Repeat every seven to 14 days depending on local conditions.

Cost:

$15/acre for potatoes.

$16/acre for sugarbeets.

$11.60/acre for beans (1991 suggested retail price).

Rate:

Clean Crop Copper 50W and Copper Spray	2.2 kg/acre. One container of Copper 50W treats 10.2 acre. One container of Copper Spray treats 0.9 acres.
Copper oxychloride 50	1.6 kg/acre. One container treats 15.6 acres.
Kocide 101	beans - 0.9 - 1.3 kg/acre sugarbeets - 0.9 - 1.8 kg/acre. One container treats 11 to 7.7 acres of beans or 11 to 5.6 acres of sugarbeets.

Water Volume:

Enough to ensure thorough coverage. Check label.

Tank Mixes:

Do not mix Copper Oxychloride 50 plus lime with insecticide wettable powders.

Restrictions:

Storage: Store in cool, dry ventilated area, away from feed or food. Keep away from heat, fire and sparks.

Preharvest Interval: 1 day.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. Get medical attention if irritation persists. If swallowed and victim is conscious, administer one or two glasses of water and induce vomiting by inserting fingers down throat. Repeat until vomit fluid is clear. Get medical attention.

Comments:

When using Kocide 101 on sugarbeets addition of a non-herbicidal agricultural spray oil is recommended.

Hazard Rating:

Warning Corrosive

Dithane M-45, Manzate 200, Manzate 200-DF, Dithane DG, Tuberseal

Formulations:

Dithane M-45 Seed Protectant Concentrate - 80 per cent mancozeb formulated as a wettable powder.

Container size: 20 kg.

Manzate 200 - 80 per cent mancozeb formulated as a wettable powder.

Container size: 20 kg.

Dithane M45 - 80 per cent mancozeb formulated as a wettable powder.

Container size: 20 kg.

Manzate 200 DF - 75 per cent mancozeb formulated as a dry flowable powder.

Container size: 20 kg.

Dithane DG - 75 per cent mancozeb formulated as a dispersible granule.

Container size: 20 kg.

Tuberseal Potato Seed Piece Dust - 16 per cent mancozeb formulated as a dust.

Container size: 10 kg.

Crops:

Wheat, barley, oats, flax, corn, potato, sugarbeets.

Diseases Controlled:

SEED TREATMENT

	DITHANE M45 SEED TREATMENT	MANZATE 200	TUBERSEAL
WHEAT	Stinking smut (bunt)		
BARLEY	False loose smut Covered smut		
OATS	Damping off Covered smut		
FLAX	Damping off Seed decay		
CORN	Root rot Seedling blight		
POTATO SEED PIECE		Seed piece decay	Seed piece decay

Foliar:

	DITHANE M-45	DITHANE DG	MANZATE 200	MANZATE 200 DF
Wheat	Tanspot, leaf rust Septoria leaf blotch			
Sugarbeets	Cercospora leaf spot		Cercospora leaf spot	
Potatoes	Early and late blight	Early and late blight	Early and late blight	Early and late blight

Crop Stage:

Potato (foliar) - Apply when plants are 4 to 6 inches (10 to 15 cm) high; repeat at seven to 10 day intervals.

Sugarbeets (foliar) - Apply when disease first threatens and repeat every seven to 10 days.

Wheat (foliar) - Apply when flag leaf has fully emerged and again seven to 10 days later when head has fully emerged.

Wheat, barley, oats, flax, corn and potato seed piece - Apply before planting.

Cost:

$5.90/acre wettable powder;

$2.10/100 kg cut seed with seed piece treatment; (1991 suggested retail price).

Rate:

Potatoes (foliar) 0.44-0.90 kg/acre.

Sugarbeet (foliar) 0.91 kg/acre.

Wheat (foliar) 0.9 kg/acre.

Potato (seed pieces) Tuberseal - 0.5 kg/100 kg seed. Manzate 200 - 1 kg /100 kg seed of 10 per cent Manzate 200 dust (see under tank mixes).

Wheat (seed) 0.026 kg/25 kg of seed.

Barley (seed) 0.033 kg/25 kg of seed.

Oats (seed) 0.046 kg/25 kg of seed.

Flax (seed) 0.056 kg/25 kg of seed.

Corn (seed) 0.056 kg/25 kg of seed.

Nozzles:

Ground - hollow cone.

Aerial - hollow cone with a D series orifice, disc and core (whirl plate) are recommended.

Water Volume:

Do not add water for potato seed piece treatment.

For foliar application: Manzate 200 / Manzate 200 DF - 17 to 100 gallons/acre (80 to 400 L/acre) by ground sprayer;

5 to 7 gallons/acre (20 to 32 L/acre) by air.

Dithane M45 (sugarbeets) - 70 gallons/acre (320 L/acre).

Tank Mixes:

For Dithane DG and Dithane M-45 add other co-applied fungicides, insecticides, growth regulators, micronutrients and spray adjuvants to the tank last.

For Manzate 200 - A dust can be made by diluting thoroughly and mixing Manzate 200 with pyrophyllite or other neutral diluent. Commonly used insecticides may displace an equivalent amount of diluent. Use dust mixtures as soon as possible after preparation.

Restrictions:

Grazing: Do not use treated seed for feed or food. Do not feed treated straw, or plant tops to livestock.

Preharvest: Potatoes - 1 day.

Sugarbeets - 21 days.

Wheat - 40 days.

Storage: Store in cool, dry, well-ventilated place.

Keep away from fire and sparks. Do not allow suspension formulation to freeze. Do not allow seed treatment slurry to freeze. Do not store seed treated with Dithane M-45 Seed Protectant.

Protective Equipment:

When spraying or handling treated seed or chemical wear:
mask and goggles
long sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. Get medical help. If swallowed and victim is conscious, dilute by giving two glasses of water to drink and get medical help immediately.

Comments:

For flax seed do not use slurry treatment.

For potato seed, if treated whole seed is cut, make a second application to protect cut surfaces. Plant as soon as possible after treating. If cut seed is not planted immediately, store in a ventilated location to allow cut surfaces to dry.

For foliar application do not apply if weather favors drift from areas treated.

Do not apply to water or wetlands.

Easout

Formulation:

70 per cent thiophanate-methyl formulated as wettable powder. Container size: 1.5 kg.

10 per cent thiophanate-methyl formulated as dust.

Container size: 10 kg.

Crops:

70 per cent WP on white beans.

10 per cent DU on potatoes (seed piece treatment only).

Diseases Controlled:

WHITE BEANS (70 PER CENT WP)	POTATO (10 PER CENT DU)
Sclerotinia (white mould)	Fusasium rot Verticillium wilt Silver scurf Also aids in control of: Seed piece decay and Blackleg infections

Crop Stage:

White beans: When conditions favor disease development (eg. warm, humid weather and heavy dense foliage) which usually occurs during early bloom stage prior to rows closing in.

Potato: Pre-plant seed piece treatment. Cut pieces should be treated within six hours of cutting.

Cost:

70 per cent WP - $34.22 - 44.00/acre;

10 per cent DU - Cost to treat 100 kg seed $3.55;

(1991 suggested retail price).

Rate:

White beans: 0.7 - 0.9 kg/acre (one container treats 2.14 to 1.67 acres).

Potato: 0.5 kg per 100 kg cut seed (one container treats 2,000 kg seed).

Water Volume:

White beans: 15 - 20 gallons/acre (37.5 - 50 gal/ha).

Potato: Do not add water.

Nozzles:

Ground - Flat fan.

Air - Hollow cone.

Effects of Weather:

Beans: If conditions favor disease, repeat applications may be warranted.

Tank Mixes:

Do not mix with lime or other alkaline materials.

Restrictions:

Grazing: Do not feed or allow livestock to graze on treated crops.

Storage: Store in a dry place.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following

protective equipment:
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting and get medical help immediately.

Liquid Disinfectant and Deodorant

Formulation:

10 per cent quaternary ammonia, formulated as a liquid.
Container size: 5 litres.

Crops:

Potato (disinfectant for potato storage areas and equipment).

Diseases Controlled:

Bacterial ring rot.

Cost:

Consult distributer.

Rates:

0.033 L/5 L of water.

Effects of Weather:

Not applicable.

Applications:

For disinfection of walls and floors of potato houses, first remove all dirt and debris with broom or vacuum. Wash, mop or spray thoroughly with solution. The same strength solution can be used to disinfect used bags, potato planters and other machinery after all dirt has been removed. Soak bags for at least one hour. Avoid contact with food products.

Tank Mixes:

Do not mix with soaps or anionic detergents.

Protective Equipment:

When mixing or applying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles.

First Aid:

If product contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, administer large amounts of milk, egg whites or water. Get medical help immediately.

Hazard Rating:

Caution Corrosive

Manzate-D, Dithane M-22

Formulation:

Contains 80 per cent maneb as wettable powder.

Container size: 10 kg.

Crops:

Potatoes & sugarbeets: foliar application - Manzate-D, potato foliar application - Dithane M-22.

Seed treatment for rye, wheat, barley (except Palliser), oats, flax, sugarbeets - Manzate-D.

Seed treatment sugarbeets - Dithane M-22.

Diseases Controlled:

Foliar

	POTATOES	SUGARBEETS
Dithane M-22	Early blight Late blight	
Manzate-D	Early blight Late blight	Cercospora leaf spot

Diseases Controlled: Seed Treatment

	SUGARBEETS	RYE AND WHEAT	BARLEY (EXCEPT PALLISER)	OATS	FLAX
Manzate-D	Damping off (Phoma and Pythium)	Bunt (Stinking smut) Seedling blight	Covered smut False loose smut Root rot	Covered smut Loose smut Seedling blight Root rot	Seedling blight Root rot
Dithane M-22	Damping off (Phoma and Pythium)				

Crop Stages:

Potatoes - begin applications early at lower rates increasing rates as vines increase in size.

Sugarbeets - apply when disease is first noticed.

Cost:

$6.00/acre (1991 suggested retail price).

Rate:

Foliar potatoes - 0.44 kg-0.91 kg/acre (10 kg treats 22.7 to 11 acres).

Foliar sugarbeets - 0.70 kg-0.91 kg/acre (10 kg treats 14.3 to 11.0 acres). Apply with spreader sticker.

Seed Treatments:

Sugarbeets	0.075 kg/25 kg seed
Rye	0.015 to 0.030 kg/25 kg seed
Wheat	0.015 to 0.025 kg/25 kg seed
Barley	0.035 kg/25 kg seed
Oats	0.045 kg/25 kg seed
Flax	0.070 kg/25 kg seed

Water Volume:

70 - 88 gallons/acre (320-400 L/acre) for low growing.

80 - 132 gallons/acre (400-600 L/acre) for heavy potato vines.

Nozzles:

Hollow cone.

Effects of Weather:

If weather favours disease, use shortest spray intervals and higher rates.

Tank Mixes:

Do not mix with Bordeaux or lime. Add insecticides, nutritional sprays or spreader stickers to tank last.

Restrictions:

Grazing: Do not use treated seed for food or feed.

Preharvest: On potatoes may be applied up to one day before harvest.

On sugarbeets may be applied up to 14 days before harvest.

Storage: Store in a cool, dry place. Keep away from flame or sparks. If product becomes wet, flammable vapours may be produced.

Recropping: None.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting by inserting finger down throat. Repeat until vomit fluid is clear. Drink plenty of water. Get medical help immediately.

Mertect

Formulation:

45 per cent w/v (450 g/L) thiabendazole formulated as a water dispersible suspension.

Container size: 4 L.

Crops:

Potato (tubers), sugarbeets.

Diseases Controlled:

POTATO (TUBERS)	SUGARBEETS
Fusarium dry rot Skin spot Silver scurf Black scurf	Cercospora leaf spot Fungal storage rots

Crop Stage:

Sugarbeets (foliar) - when disease is noticed.

Potatoes - post harvest treatment.

Cost:

$452.00 will treat 89 metric tonnes of stored potatoes or 615 metric tonnes of sugarbeets.

$9.00 - $18.00/acre of sugarbeets (1991 suggested retail price).

Rates:

Potatoes - 8 L/33 gallons (170 L) of water.

2 L of the above solution treats 1 metric tonne. (Two containers treat 89 metric tonnes.)

Sugarbeets - (foliar) - 0.16 to 0.32 L/acre.

(root) - 0.013 L/metric tonne.

Water Volume:

Sugarbeets (foliar):

ground application - 10 to 40 gallons/acre (40-200 L/acre).

air application - 1 to 4 gallons/acre (4-16 L/acre).

Sugarbeets (root):

sufficient water for complete coverage.

Potatoes:

8 L/33 gallons (170 L) of water.

Restrictions:

Storage: Minimum storage temperature 0° C.

Tank Mixes:

Before mixing with other chemicals, consult the manufacturer.

Protective Equipment:

When spraying, wear:

long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. Get medical attention. If swallowed, do not induce vomiting. Get medical attention.

Comments:

Do not allow suspension to stand without continuous agitation.

Potatoes must rotate along conveyor line to ensure complete coverage.

Prior to treating potatoes destined for export, confirm with authorities that treated potatoes will be allowed to enter importing country.

N-M Drill Box Seed Treatment Powder and N-M Dual Purpose

Formulations:

N-M Drill Box contains 50 per cent maneb formulated as powder.

Container size: 1 kg.

N-M Dual Purpose contains 37.5 per cent maneb and 18.75 per cent lindane* formulated as powder.

Container size 1 kg.

* Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Wheat, rye, oats, barley (except Palliser) with N-M Drill Box also for flax.

Diseases Controlled:

WHEAT	BARLEY	OATS	RYE	FLAX
Stinking smut (bunt) Seed borne seedling blight Root rot	Covered smut False loose smut Seed borne seedling blight Root rot	Loose smut Covered smut Seed borne seedling blight Root rot	Bunt Seed borne seedling blight Root rot	Seedling blight Damping off

Crop Stage:

Seed treatment.

Cost:

NM Drill Box $8.95/1 kg.

NM Dual Purpose $13.50/1 kg (1991 suggested retail price).

Rates:

CROP	N-M DRILL BOX		N-M DUAL	
	RATE/25 kg SEED	AMOUNT SEED TREATED/PKG	RATE/25 kg SEED	AMOUNT SEED TREATED/PKG
Wheat	26 - 40 g	961 - 625 kg	52 g	480 kg
Barley	50 - 66 g	500 - 378 kg	65 g	384 kg
Oats	69 - 92 g	362 - 272 kg	92 g	271 kg
Rye	28 - 43 g	892 - 581 kg	59 g	446 kg
Flax	112 g	223 kg		

Water Volume:

Not applicable.

Tank Mixes:

Not applicable.

Restrictions:

Grazing: Do not use treated seed for food or feed.

Storage: Store in a dry, ventilated place. Avoid overheating. Keep away from fire or spark. Do not store treated seed for more than one year.

Protective Equipment:

When handling product or treated seed, wear:
long -sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles
dust mask.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If victim has swallowed N-M DUAL PURPOSE and victim is conscious, induce vomiting. Get medical help immediately.

Hazard Rating:

Danger Poison

Polyram 80-W, Polyram DF, Polyram 7D, Polyram-Diazinon

Formulation:

Polyram 80W - contains 80 per cent metiram formulated as wettable powder.

Container size: 25 kg.

Polyram 7 Dust - contains 7 per cent metiram formulated as dust.

Container size 25 kg.

Polyram DF - contains 80 per cent metiram formulated as dry flowable.

Container size: 20 kg.

Polyram-Diazinon Fungicide/Insecticide Dust - contains 7 per cent metiram + 0.125 per cent diazinon* formu-

lated as dust.

Container size 25 kg.

* Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Potatoes and sugarbeets - Polyram 80-W and Polyram DF.

Potatoes only - Polyram 7 Dust and Polyram-Diazinon.

Diseases Controlled:

	POTATOES	SUGARBEETS
Polyram 80-W, Polyram DF	Early blight Late blight	Cercospora leaf spot
Polyram 7D	Early blight Late blight Seed treatments: Fusarium seed piece decay Blackleg Seed borne common scab	None
Polyram-Diazinon	Seed treatment only: Fusarium seed piece decay Blackleg Seed borne common scab	None

Crop Stage:

Sugarbeets: Begin applications as soon a disease is noticed at seven to 10 day intervals according to weather.

Potatoes: For Polyram 80-W and Polyram DF use lowest rates at seven to 10 day intervals until plants cover the row then use highest rates until top kill; or use lowest rates at five to seven day intervals beginning when plants are 6 inches (15 cm) high and continue until top kill. For Polyram 7D begin applications when plants are 6 inches (15 cm) high at seven to 10 day intervals until top kill.

Potato Seed: Polyram 7D and Polyram-Diazinon. Plant seed as soon as possible after treating.

Cost:

$30.00 for 20 kg Polyram 7 Dust.

$130.00 for 20 kg Polyram DF.

$6.00/acre of Polyram DF or Polyram 80-W.

$1.50 - $2.50/100 kg of seed Polyram 7D (1991 suggested retail price).

Rates:

CROP	FORMULATION	QUANTITY	AMOUNT OR AREA ONE PACKAGE TREATS
Potato	Polyram 80-W Polyram DF Polyram 7D	0.44 - 0.90 kg/acre 0.44 - 0.90 kg/acre 11.0 - 13.0 kg/acre	56 - 27 acres 45 - 22 acres 2.3 - 1.9 acres
Sugarbeets	Polyram 80-W Polyram DF	0.90 kg/acre 0.90 kg/acre	27 acres 27 acres
Potato seed piece	Polyram 7D Polyram-Diazinon	1 - 1.5 kg/100 kg seed 1 - 1.5 kg/100 kg seed	2500 - 1670 kg 2500 - 1670 kg

Water Volume:

For Polyram 80-W, Polyram DF:

Ground: 8.8 - 17.6 gal/acre (40 - 80 L/acre);

Aircraft: 4.8 gallons/acre (22 L/acre).

Nozzles:

Hollow cones or flat fans recommended.

Effects of Weather:

When weather conditions favour disease development the shorter spray intervals may be required. Treated potato seed should not be allowed to stand in hot sun or drying wind. Seed should not be planted into hot, dry or cold, wet soils.

Tank Mixes:

Do not mix with liquid fertilizers, Bordeaux mixture or hydrated lime. Mixtures with diazinon or malathion should be prepared immediately prior to use and not allowed to stand in the tank.

Restrictions:

Grazing: Do not use treated crop parts for feed or food.

Preharvest: For potatoes, may be applied up to the day before harvest. For sugarbeets, do not apply later than 21 days before harvest.

Recropping: None

Storage: Store in a cool dry place away from flame or sparks. If product becomes wet or overheated effectiveness is reduced and flammable vapors may be produced.

Do not freeze.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, remove contaminated clothing and wash skin with soap and water. Get medical attention. If in eyes, flush with water immediately for 15 minutes. Get medical attention. If swallowed and victim is conscious, induce vomiting by giving a tablespoon of salt in a glass of warm water. Repeat until vomit fluid is clear. Get medical attention.

Potato Seed-Piece Treatment +

Formulation:

7.5 per cent captan and 0.1 per cent Diazinon* formulated as a dust. Container size: 25 kg.

*Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Potato.

Diseases Controlled:

Seed piece decay, damping off, blackleg, rhizoctonia, seed-borne common scab and aid in control of verticillium wilt.

Crop Stage:

Seed piece treatment.

Cost:

$51.00 for 100 kg of seed pieces.

Rate:

1 kg of dust/100 kg of whole or cut seed pieces.

Restrictions:

Grazing: Do not use treated seed for food or feed. Do not contaminate bodies of water as product is harmful to fish.

Storage: Store away from fire or sparks, in a cool, dry place.

Handling: Never handle with bare hands.

Protective Equipment:

When handling, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles
respirator.

First Aid:

If product contacts skin, wash off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes and get medical attention. If swallowed, give patient one to two glasses of water and cause vomiting by giving one-dose of syrup of ipecac. If vomiting has not occurred within 20 minutes, give a second dose. If syrup of ipecac is not available, give one to two glasses of water and cause vomiting by inserting finger down the throat. Repeat with water until vomit fluid is clear. Patient should be lying down with head below level of the feet.

Premiere Flowable

Formulation:

1.6 per cent thiabendazole plus 4.8 per cent thiram plus 40 per cent lindane *.

Container size 10 L, 100 L, 1008 L

* Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Canola, mustard.

Diseases Controlled:

CANOLA	MUSTARD
Blackleg (seed borne) Pre-emergence damping off Seed decay	Pre-emergence damping off Seed decay

Crop Stage:

Seed treatment.

Cost:

$405.00 - 10 L. Cost to treat 25 kg - $29.00 (1991 suggested retail price).

Rate:

0.7 L/25 kg seed, 10 L/355 kg seed.

Effects of Weather:

Best coverage is obtained when product is stored above 0° C before and during treating of seed.

Tank Mixes:

Not applicable.

Restrictions:

Feeding: Do not use treated seed for feed or food. Do not sell to oil mills.

Storage: Store in a cool, dry, well-ventilated area.

Do not freeze.

Protective Equipment:

When spraying or handling treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate or treated seed, add the following protective equipment:

impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious administer one or two large glasses of water and induce vomiting by inserting finger down throat. Repeat until vomit is clear. Do not give anything by mouth if person is unconscious or convulsing. Get medical help immediately.

Comments:

Do not consume alcoholic beverages within 24 hours before or after working with thiram.

This treatment provides only early season control against seed borne blackleg.

Hazard Rating:

Danger Poison

Rovral Flo

Formulation:

250 g/L iprodione formulated as a flowable.

Container size: 2 X 8 L pack.

Crops:

Canola.

Diseases Controlled:

Sclerotinia stem rot.

Crop Stage:

Apply when crop is at the 20 to 30 per cent bloom stage. For Argentine varieties when 15 - 20 flowers open (including small pods) on the main stem. For Polish varieties when 11 - 15 flowers (or small pods) are open on main stem.

Cost:

$385.00 for 2 X 8 L pack;

$19.25 / acre canola; (1991 suggested retail price).

Rate:

0.8 to 1.2 L/acre, 8 L container treats 10 acres.

Water Volume:

Ground - 10 gallons/acre (45 L/acre);

Air - 4 gallons/acre (18 L/acre).

Nozzles:

Flat fan or hollow cone for ground and properly calibrated aerial equipment.

Effects of Weather:

Do not spray in heavy dew or when rain is imminent. Spraying should be carried out in crosswind where possible. Avoid spraying in a dead calm and when wind speeds exceed 20 km/hour.

Restrictions:

Preharvest: None specified if applied at correct crop stage.

Storage: Store above 0 ° C.

Protective Equipment:

When handling product wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron

goggles
respirator.

First Aid:

If product contacts skin, rinse off immediately with water, then wash affected area with soap and water before eating, smoking or drinking. If in eyes, flush with water immediately for 15 minutes. Get medical attention. If swallowed and patient is conscious, wash out mouth. If breathing stops, start artificial respiration. Get medical attention. If inhaled, get medical attention.

Hazard Rating:

Caution Poison

Rovral ST

Formulation:

167 g/L iprodione, 500 g/L lindane*, contains a blue dye. Formulated as a liquid flowable.

Container size 100 L.

*Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Canola.

Diseases Controlled:

Protection during germination and early growth from damping off and root rot caused by Rhizoctonia solani and seed borne blackleg.

Crop Stage:

Seed treatment.

Cost:

To treat 25 kg seed - $26.75 (1991 suggested retail price).

Rate:

0.75 L per 25 kg seed;

100 L treats 3,333 kg of seed.

Tank Mixes:

Rovral ST-treated seed can be mixed with the granular insecticides Furadan CR-10 and Counter 5G.

Restrictions:

Feeding: Do not use treated seed for food, feed or oil processing.

Storage: Protect from freezing. Do not store treated seed for more than six months. Treated seed stored for more than six months should be tested for germination before planting. Store treated seed in cool, dry conditions.

Protective Equipment:

When mixing or handling concentrate or treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. Seek medical attention. If swallowed and victim is conscious, rinse out mouth and induce vomiting by touching the back of the throat with a finger or blunt object. Milk or oil products must NOT be given. Get medical attention.

Hazard Rating:

Danger Poison

Thiram 75WP

Formulation:

75 per cent thiram formulated as wettable powder.
Container size: 1.5kg.

Crops:

Mustard, sugarbeets, grasses, dry beans, peas, soybeans and corn.

Diseases Controlled:

Seed decay, seedling blight, damping off.

Crop Stage:

Seed treatment.

Cost:

$1.60/25 kg sugarbeets, grasses, mustard;
$0.43 to 0.61/kg soybeans, dry beans, peas;
$0.53/25 kg corn (1991 suggested retail price).

Rate:

CROP	kg Thiram/ 25 kg SEED	AMOUNT OF SEED ONE PACKAGE TREATS
Mustard, Grasses, Sugarbeets	0.09 kg	416 kg
Dry beans, Peas, Soybeans	0.025 to 0.035 kg	1500 - 1071 kg
Field corn	0.03 kg	1250 kg

Restrictions:

Grazing: Do not use treated seed for food or feed. Do not graze for 4 weeks after planting. Do not sell treated seed to oil mills.

Storage: Store in a cool, dry, ventilated place. Keep away from flame, sparks and heat.

Protective Equipment:

When handling product or treated seed wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting with syrup of ipecac (adult or child 12 and over - 30 ml, child under 12 years - 15 ml), followed by water. Get medical attention.

Comments:

Do not consume alcohol within 24 hours before or after working with thiram.

Hazard Rating:

Warning Poison

Tilt

Formulation:

250 g/L propiconazole formulated as an emulsifiable concentrate.

Container size: 4 L.

Crops:

Prairie spring wheat, soft white wheat, winter wheat, barley.

BARLEY	PRAIRIE SPRING WHEAT SOFT WHITE WHEAT WINTER WHEAT
Leaf rust, septoria, net blotch, scald, powdery mildew	Leaf rust, stem rust, tan spot, septoria, powdery mildew

Diseases Controlled:

Crop Stage:

Wheat: Apply at early stem elongation and up to the stage where the head is half emerged.

Barley: Apply at early stem elongation but before head has emerged.

Cost:

$12.25/acre (1991 suggested retail price).

Rate:

0.2 L/acre (one 4 L container treats 20 acres).

Water Volume:

Ground: 16 - 20 gallons/acre (40 - 160 L/acre). Optimum 20 gallons/acre (80 L/acre).

Nozzles:

Flat fan - ground.

Flat fan or hollow cone - air.

Effects of Weather:

Best results when no rainfall occurs within one hour of application. Should this occur, reapplication may be necessary.

Restrictions:

Grazing: Do not feed straw from treated crops to livestock.

Preharvest: 45 day interval.

Recropping: None.

Storage: Do not freeze.

Toxicity: Toxic to fish.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water for at least 15 minutes. Get medical attention if irritation persists. If swallowed and victim is conscious, have victim drink large amounts of water. Do not induce vomiting. Get medical help immediately.

If inhaled, remove victim from contaminated area.

Hazard Rating:

Caution Poison

Vitavax Dual Powder, Vitavax Dual Solution

Formulation:

Vitavax Dual Powder contains 20 per cent carbathiin, 28.9 per cent thiram, and 18.7 per cent lindane formulated as powder. Container size: 1.5kg.

Vitavax Dual Solution contains 180 g/L carbathiin and 165 g/L lindane* formulated as a solution. Container size: 4 L, 10 L, 200 L.

*Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Wheat, barley, oats, rye. Vitavax Dual Powder on flax also.

Diseases Controlled

	BARLEY	OATS	WHEAT	RYE	FLAX
Vitavax Dual Powder	False loose smut True loose smut Covered smut	Loose smut Covered smut	Loose smut Stinking smut	Stem smut Damping off Seed decay	Damping off Seed decay
Vitavax Dual Solution	False loose smut True loose smut Covered smut *suppression of leaf stripe, net blotch, common root rot	Loose smut Covered smut *suppression of common root rot	Loose smut Stinking smut *suppression of common root rot	Stem smut *suppression of common root rot	

* will not protect post-seedling plants from infection.

Seed borne seed rots and seedling blights are generally reduced with both powder and solution.

Crop Stage:

Seed treatment.

Cost:

Vitavax Dual Powder cost to treat 25 kg - $2.00 to 3.17;

Vitavax Dual Solution cost to treat 25 kg - $2.25 to 2.70; (1991 suggested retail prices).

Rates:

	VITAVAX DUAL POWDER		VITAVAX DUAL SOLUTION	
CROP	kg POWDER/ 25 kg SEED	kg SEED TREATED/ CONTAINER	L/25 kg SEED	kg SEED/ 4 L
Wheat	0.055 to 0.065	681 - 576	0.075 to 0.09	1333 - 1111
Barley	0.07	535	0.075 to 0.09	1333 - 1111
Oats	0.095	395	0.075	1111
Rye	0.06	625	0.075	1111
Flax	0.07	535	–	–

Water Volume:

Do not dilute Vitavax dual solution with water.

Tank Mixes:

None.

Restrictions:

Grazing: Feeding - do not graze or feed livestock on treated area for four weeks after planting. Do not use treated seed for feed, food or oil processing.

Storage: Do not store Vitavax dual solution below 0°C and keep away from spark and flame. Store powder in a dry place. Do not store seed treated with Vitavax Dual Powder.

Protective Equipment:

When mixing or handling concentrate, or treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes lifting upper and lower lids occasionally. Get medical attention.

If Vitavax Dual Powder has been swallowed, induce vomiting. Give syrup of ipecac (12 years and older - 30 ml; younger than 12 years - 15 ml). Follow with water to induce vomiting. Get medical attention. Bring labelled container with you.

If Vitavax Dual Solution has been swallowed, give one to two glasses of water and cause vomiting by giving one dose of syrup of ipecac. If no vomiting occurs after 20 minutes give a second dose. If this syrup is unavailable give one to two glasses of water and cause vomiting by inserting finger down throat. Repeat with water until vomit fluid is clear. Keep patient quiet, get medical attention bringing labelled container with you.

Comments:

Vitavax Dual Powder contains thiram. Do not consume alcohol within 24 hours before or after working with product or thiram-treated seed.

Vitavax Dual Solution may damage painted surfaces by removing paint or leaving stain.

Hazard Rating:

Vitavax Dual Solution - Warning Poison

Vitavax Dual Powder - Danger Poison

Vitavax Powder, Vitaflo-280, Anchor

Formulation:

Vitavax Powder contains 26.7 per cent carbathiin and 38.8 per cent thiram formulated as powder. Container size: 1.5 kg.

Vitaflo-280 contains 14.9 per cent carbathiin and 13.2 per cent thiram formulated as a suspension. Container size: 10 L, 200 L, 1000 L.

Anchor contains 66.7 g/L carbathiin and 66.7 g/L thiram formulated as a suspension.

Container size: 0.9 L, 5L.

Crops:

Vitavax Powder - Oats, barley, wheat, rye, flax, soybeans.

Vitaflo-280 - Oats, barley, wheat, rye, triticale, flax, soybeans, dry beans, corn.

Anchor - Oats, barley, wheat, rye, triticale, flax, soybeans.

Diseases Controlled:

With Vitaflo-280 and Anchor - Seed borne seed rots and seedling blights are generally reduced.

Cereals:

	WHEAT	BARLEY	OATS	RYE	TRITICALE
Vitavax Powder	Loose smut Stinking smut (bunt)	False loose smut True loose smut Covered smut	Loose smut Covered smut	Stem smut Seed decay Damping off	
Vitaflo-280	Loose smut Stinking smut (bunt)	False loose smut True loose smut Covered smut Suppression of: net blotch	Loose smut Covered smut	Stem smut Seed decay Damping off	Damping off Seedling blight Seed decay
Anchor	Loose smut Stinking smut Suppression of: root rot	False loose smut True loose smut Covered smut Suppression of: Net blotch Leaf stripe Root rot	Loose smut Covered smut	Stem smut Seed decay Damping off	Damping off Seedling blight Seed decay

Special Crops:

	FLAX	SOYBEANS	DRY BEANS	CORN
Vitavax powder	Damping off Seed decay	Damping off Seed decay		
Vitaflo-280	Damping off Seed decay	Damping off Seed decay	Damping off Seed decay	Damping off Seed decay Seed borne head smut
Anchor	Damping off Seed decay	Penicillium and Aspergillus storage moulds seed decay seedling blights/ seed rots		

Crop Stage:

Seed treatments only.

Cost:

Vitavax Powder - $34.50/1.5 kg, cost to treat 25 kg at 55 g rate - $1.27

Anchor - $60.00/5 L, cost to treat 25 kg at 150 ml - $1.80; 200 ml - $2.40; 300 ml - $3.60 (1991 suggested retail price).

Rates:

	VITAVAX (kg)	VITAFLO-280 (L)	ANCHOR (L)
WHEAT / 25 kg seed	0.04 - 0.055	0.057 - 0.082	0.2
BARLEY / 25 kg seed	0.05	0.057 - 0.082	0.2
OATS / 25 kg seed	0.07	0.082	0.2
RYE / 25 kg seed	0.045	0.057 - 0.082	0.2
TRITICALE / 25 kg seed		0.05	0.2
FLAX / 25 kg seed	0.06	0.131	0.3
SOYBEANS / 25 kg seed	0.065	0.065	0.15
DRY BEANS / 25 kg seed		0.065	
CORN / 25 kg seed		0.07	
CORN HEAD SMUT / 25 kg seed		0.14 - 0.187	

Water Volume:

Vitaflo-280 can be diluted with water for use in slurry treaters. Dilute Vitaflo-280 to apply the specified rate of undiluted Vitaflo-280. Do not use slurry treatment on flax. See Vitaflo-280 operating manual for specific directions regarding dilution.

Tank Mixes:

Mixing of Vitaflo-280 with other seed treatment products may result in gelling or sedimentation. Seed treater lines and reservoirs should be thoroughly cleaned before use of Vitaflo-280. To clean flush with water containing detergent.

Restrictions:

Grazing: Feeding - Do not graze or feed livestock on treated area for four weeks after planting. Do not use treated seed for feed, food or oil processing.

Storage: Store powder in a dry place. Do not store seed treated with Vitavax powder. Do not store Anchor in direct sunlight, above 35 ° C or below 0° C. Do not store seed treated with Anchor. Do not store Vitaflo-280 in direct sunlight or above 35 ° C. Vitaflo-280 will not freeze even at extreme temperatures. Do not store dry beans or soybeans treated with Vitaflo-280. See label for other treated seed storage restrictions.

Protective Equipment:

When handling product or treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and warm water for 15 minutes. If in eyes, flush with running water immediately for 15 minutes. Get medical attention. If swallowed and victim is conscious, induce vomiting with syrup of ipecac (adult or child 12 years and older - 30 ml; child under 12 years - 15 ml) followed by water to induce vomiting. Keep patient quiet. Get medical attention immediately, bringing labelled container with you.

Comments:

Avoid drinking alcohol within 24 hours before or after handling product or treated seed.

Do not apply Anchor through commercial seed treating equipment or through an auger as excessive seed wetness may result.

Flax must be treated with Anchor in a cement mixer or similar equipment and left to dry before seeding. If treated in the drill box it will be too wet to flow.

Anchor will perform as a sticker for inoculum applied to soybeans.

Hazard Rating:

Warning Poison

Vitavax RS Flowable, Vitavax RS Powder, Cloak

Formulation:

Vitavax RS Flowable contains 45 g/L carbathiin, 90 g/L thiram, 680 g/L lindane* formulated as a suspension. Container size: 4 L, 100 L, 1000 L.

Vitavax RS Powder contains 3.3 per cent carbathiin, 6.7 per cent thiram and 50 per cent lindane* formulated as a powder. Container size: 1.5 kg.

Cloak contains 45 g/L carbathiin, 90 g/L thiram, and 533 g/L lindane*. Container size: 100 L.

*Consult Manitoba Agriculture's *Insect Control Guide* for insect control recommendations.

Crops:

Canola, rapeseed and mustard.

Vitavax RS Flowable is also registered on cole crops.

Diseases Controlled:

CHEMICAL	CANOLA, RAPESEED	MUSTARD
Vitavax RS Flowable	Seed decay, Pre-emergence damping off Seed borne blackleg	Seed decay Pre-emergence damping off
Cloak, Vitavax RS Powder	Seed decay, Pre-emergence damping off Seed borne blackleg	Seed decay Pre-emergence damping off Seed borne blackleg

Crop Stage:

Seed treatment only.

Rate:

CHEMICAL	RATE/25 kg SEED	AMOUNT SEED TREATED/PKG
Vitavax RS Flowable	0.56 L	175 kg
Vitavax RS Powder	0.75 kg	50 kg
Cloak	0.562 L	175 kg

Water Volume:

Not applicable.

Tank Mixes:

Not applicable.

Restrictions:

Grazing: Feeding - Do not use treated seed for food, feed or oil processing. Do not graze or feed livestock on treated area for four weeks after planting.

Storage: Store powder in a dry place. Keep flowable above 10° C prior to and during application. Keep away from direct heat.

Storage: Do not store seed treated with powder. Do not store seed treated with flowable or Cloak above 25° C or in direct sunlight. Seed treated with flowable should have germination re-tested if stored for periods in excess of nine months. Do not store cole crop seed which has been treated.

Protective Equipment:

When handling product or treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water for 15 minutes. If in eyes, flush with water immediately for 15 minutes. If swallowed and victim is conscious, induce vomiting with syrup of ipecac followed by water to induce vomiting. Keep victim quiet. Get medical help immediately.

Comments:

Do not consume alcohol within 24 hours before or after working with fungicide containing thiram or the treated seed.

Hazard Rating:

Danger Poison

Vitavax Single Solution

Formulation:
Contains 230 g/L carbathiin formulated as a solution.
Container size: 4 L, 10 L, 200 L.

Crops:
Barley, wheat, oats, rye, flax.

Diseases Controlled:
Emergence is generally increased by reduction of seed borne seed rots and seedling blights.

Crop Stage:
Seed treatment.

Cost:
To treat 25 kg seed - $0.97 to 1.62; (1991 suggested retail price).

BARLEY	WHEAT	OATS	RYE	FLAX
Covered smut True loose smut False loose smut *Suppression of: net blotch; leaf stripe; common root rot	Loose smut Stinking smut (bunt) Suppression* of: common root rot	Covered smut Loose smut Suppression* of: common root rot	Stem smut Suppression* of: common root rot	Seed decay Damping off

* will not protect post seedling plants from infection.

Rate:

CROP	L/25 kg SEED	kg SEED TREATED/ 4 L CONTAINER
Wheat	0.06 to 0.075	1666 - 1333
Barley	0.06 to 0.075	1666 - 1333
Oats	0.06	1666
Rye	0.06	1666
Flax	0.1	1000

Water Volume:
Do not dilute with water.

Tank Mixes:
None.

Restrictions:
Grazing: Feeding - do not graze or feed livestock on treated areas for four weeks after planting. Do not use treated seed for feed, food or oil processing.

Storage: Do not store below 0 ° C. Product is flammable. Keep away from flame and sparks.

Protective Equipment:
When mixing or handling concentrate or treated seed, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat
impermeable apron
goggles
respirator.

First Aid:

If fungicide contacts skin, rinse off immediately with large quantities of water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. If swallowed, do not induce vomiting. Get medical help immediately.

Comments:

Product may damage painted surfaces by removing paint or leaving stain.

Do not use rubber or PVC hose.

Zineb 80

Formulation:

Clean Crop Zineb 80W - 80 per cent zineb formulated as a wettable powder.

Container size: 10 kg.

Crops:

Potatoes.

Diseases Controlled:

Early blight and late blight.

Crop Stage:

First application when plants are 10-15 cm and repeat at seven-10 day intervals.

Cost:

$13.30/acre (1991 suggested retail price).

Rate:

0.8 - 1.3 kg/acre.

Water Volume:

100 to 500 gallons/acre (400 to 600 L/acre).

Tank Mixes:

Compatible with most commonly used insecticides. Consult manufacturer.

Restrictions:

Preharvest: One day interval.

Storage: Store in cool, dry, well ventilated area.

Keep away from fire or sparks.

Protective Equipment:

When spraying, wear:
long-sleeved shirt/long pants
coveralls
chemical-resistant boots
chemical-resistant gloves (unlined neoprene or nitrile)
wide brimmed hard hat.

When mixing or handling concentrate, add the following protective equipment:
impermeable apron
goggles.

First Aid:

If fungicide contacts skin, rinse off immediately with water, then wash affected area with soap and water. If in eyes, flush with water immediately for 15 minutes. Get medical attention. If swallowed and victim is conscious, induce vomiting with warm salt water. Get medical attention. If inhaled, remove victim to fresh air.

Comments:

Toxic to fish, do not contaminate bodies of water.

Hazard Rating:

Caution Poison

EMERGENCY NUMBERS

Poison Control Centre
1-787-2591

Pesticide Spills Line
1-945-4888